

A Support Member Assembly

Background and Field of the Invention

5 The invention relates to a support member assembly, and especially for at least partially supporting a wall.

Walls constructed from bricks and other building or construction blocks, such as concrete blocks, have a maximum length and height to which they can be
10 constructed without requiring additional support to prevent collapsing of the wall. Conventionally, brick walls have been supported by erecting concrete supports at intervals along the brick wall, both horizontally and vertically, to support the wall. As the brick wall requires to be mechanically tied to the concrete supports, it is conventional practice to use metal rods, which are fixed
15 to the mortar joints of the brick wall and to the concrete supports to tie the brick wall to the concrete supports.

However, one of the disadvantages of this conventional approach is that the construction and use of the concrete supports is both time consuming and
20 labour intensive. In order to form the concrete support it is necessary to construct shuttering to enclose the volume into which the concrete is to be poured. The shuttering is normally constructed from wooden boards and the services of a carpenter are required to construct the shuttering. In addition, during construction of the shuttering, it is necessary to insert the metal rods,
25 which will be used to tie the brick wall to the concrete support, through the side

walls of the shuttering so that the metal rods extend outside the shuttering and into the internal volume of the shuttering where the concrete is to be poured. This requires the services of a steel bender to bend and install the metal rods as required.

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After the shuttering is complete and the metal rods have been inserted, concrete is then poured into the shuttering and permitted to harden before the shuttering is removed. When the shuttering is removed, the metal rods are bonded to the concrete and the brick wall is tied to the concrete supports by the
10 metal rods.

Hence, the conventional method of supporting brick walls using concrete supports is time consuming, labour intensive and requires the services of three different tradesman (carpenter, steel bender and concrete pourer) in addition to
15 a brick layer to construct the wall itself.

It is an object of the present invention to provide a support member assembly which alleviates at least one of the disadvantages of the prior art and/or to provide the public with an useful choice.

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Summary of the Invention

In accordance with the present invention, there is provided a support member assembly comprising an elongate support member having an effective length,
25 an elongate member engagement portion arranged to engage with one end of

the elongate support member to extend the member's effective length, and a base portion including connection means for releasably connecting to the elongate member engagement portion or to the elongate support member.

- 5 An advantage of the described embodiment is that the parts of the assembly i.e. the elongate support member, the elongate member engagement portion and the base portion can be manufactured separately and may be assembled on site thus increasing productivity. Further, each part can be packed together with like parts to reduce space thus easier for shipment. On site, the user can then
- 10 decide based on the design requirements, whether the base portion is to be connected to the elongate member engagement portion or directly to the elongate support member.

Preferably, the connection means is adapted to be connectable only to the

15 elongate member engagement portion.

The elongate member and the elongate member engagement portion each may have a side wall adapted to be located adjacent an end of a wall to be supported, in use. Each side wall may then include a plurality of engagement

20 means which permit a tie member to be mounted on the side wall, the tie member having a portion projecting from the side wall to engage with the wall to be supported. Preferably, the plurality of engagement means are provided at discrete locations along the side walls of the elongate member and the elongate member engagement portion such that position of the tie members are

25 adjustable.

The engagement means may be provided on opposite sides of the elongate member and/or the elongate member engagement portion. Alternatively, the engagement means is provided on all four sides of the elongate member and/or
5 the elongate member engagement portion.

The engagement means may comprise slots and the slots may be elongate and comprises an opening extending in a first direction substantially perpendicular to the longitudinal direction of the slots. Preferably, the opening of
10 each slot permits a tie member to be mounted on the side wall, the tie member having a portion projecting from the side wall to engage with the wall to be supported.

The slots may be arranged along at least two substantially parallel axes along
15 the longitudinal axis of the elongate support member and the elongate support member engagement portion with the openings of slots along one of the axis facing in a direction opposite to the openings of slots along the other axis, the directions of both openings being substantially perpendicular to the longitudinal axis of the elongate support member and the elongate support
20 member engagement portion.

Preferably, each slot comprises two recesses extending in a direction opposite the direction of the opening of the same slot. Alternatively, the two recesses are adapted to extend along the same direction as the opening of one of the slots.

Preferably, a slot along one axis is offset from an adjacent slot along the other axis such that the openings of the slots are not aligned with each other.

Preferably, the recess of one slot is aligned with the recess of an adjacent slot despite the offset.

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Advantageously, the position of each slot is used as a guide for selectively cutting the elongate member or the elongate member engagement portion to a desired length. In this manner, when the elongate member or the elongate member engagement portion member is cut in accordance with the cutting
10 guide, the aligned recesses of the adjacent slots are arranged to be connectable with the connecting means of the base portion.

Preferably, the connection means includes projections arranged to engage selectively at least one of the recesses of a slot. Alternatively, the connection
15 means includes projections arranged to engage respective aligned recesses.

The projections may be angled to form generally L-shaped projections. Preferably, there are two projection pairs, a pair of which is longer than the other pair. One projection pair may be arranged to connect with one side
20 surface of the elongate support member and the other projection pair may be arranged to connect with the opposing said surface of the elongate support member.

It is envisaged that one projection pair may be arranged to connect with one
25 side surface of the elongate member engagement portion and the other

projection pair may be arranged to connect with the opposing said surface of the elongate member engagement portion.

Preferably, the base portion includes stoppers arranged to abut against a side surface of the elongate support member or the elongate member engagement portion to limit movement along one direction.

The base portion may be arranged to engage with a support structure. Depending on application, the base portion may include a bent edge.

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The base portion may be adapted to engage with a said elongate support member. In this application, the base portion may have an attachment section for attachment to a side wall of one of the elongate members. Preferably, the attachment section includes lugs.

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Advantageously, the support member engagement portion is engageable with both ends of the elongate member.

Brief Description of the Drawings

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An example of a support member system in accordance with the invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a brick wall supported by a support member system having vertical and horizontal stiffeners according to a preferred embodiment of the present invention;

Figure 2 shows the support member system of Figure 1 without the wall portions;

Figure 3 is an enlarged and exploded view of the region A of Figure 2 showing configuration of engagement means of a vertical stiffener;

Figure 4 are enlarged and exploded views of a base plate used in the support member system of Figure 2;

Figures 5a to 5d show how the base plate of Figure 4 is being connected to the vertical stiffener of Figure 2;

Figure 6 is an enlarged and exploded view of how the base plate of Figure 4 that is releasably connectable to the vertical stiffener of Figure 2;

Figure 7 are enlarged and exploded views of a side base plate for use with the horizontal stiffener of Figure 2;

Figure 8 is a perspective view of the support member system of the present invention being used to support different wall configurations;

Figure 9 are views of a corner base plate for use with the vertical stiffener for specific applications;

Figure 10 is a rear perspective view of a tie member of Figure 1;

Figure 11 shows a variation of the side base plate of Figure 7;

Figure 12 shows an application of the side base plate variation of Figure 11;

Figure 13 illustrates views of a variation of the tie member shown in Figure 10; and

Figure 14 shows another application of the side base plate variation of Figure 11.

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Detailed Description of Preferred Embodiment

Figure 1 shows a section of a wall 1 which is supported by a support member system 100 according to the preferred embodiment of the present invention.

10 The support member system 100 includes a number of elongate members 101 and in this embodiment, these are arranged as vertical stiffeners 102 (only one shown) and horizontal stiffeners 103 which interconnects the vertical stiffener 102. As shown in Figure 1, the vertical stiffener 102 supports three portions 4, 5, 6 of the wall 1 and the vertical and horizontal edges of the portions 4, 5, 6
15 adjacent respectively to the vertical stiffener 102 and horizontal stiffener 103 are mechanically connected to respective stiffeners 102, 103 by means of a number of ties 7 engageable with engagement means 120 formed on a side surface of the stiffeners 102, 103 (in Figure 1, only one tie member 7 is shown and the wall portion to which it engages has been removed to show the tie member clearly).

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The vertical stiffener 102 is connected at each of its upper and lower ends to an upper support 8 and to a lower support 9, respectively by a connector 110. In addition, each end of the horizontal stiffeners 103 is connected to the side of the vertical stiffener 102 by a connector 111.

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The support member system 100 also includes elongate member engagement portions in the form of sleeve members 130,135 for engaging with an end of the stiffeners 102,103 to extend the stiffener's effective length.

- 5 The support member system 100 also includes base portions and in this embodiment, these are in the form of base plates 110,111 arranged to engage with the upper support 8 or the lower support 9 of Figure 1, or with a vertical stiffener 102, in the case of the side base plate 111 being used with a horizontal stiffener 103.

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Mechanical fasteners may be inserted through the base plate 110 to attach the plate 110 to the underside of the upper support surface 8 and the upper side of the lower support surface 9. The mechanical fasteners are preferably powder actuated fasteners but may, alternatively, be any type of suitable fastener, such as nails, masonry nails or anchor bolts. If the fasteners are not powder actuated
15 preferably, holes for fasteners are pre-drilled in the base plate 110.

In this embodiment, each of the vertical and horizontal stiffeners 102, 103 are fabricated by roll-forming from sheets of pre-galvanised steel and laser welded
20 at the sheet's edges to form a hollow box section. In this way, it helps to reduce production time than if the stiffeners are formed from two separate extrusions. Further, the stiffeners 102,103 are generally the same and thus, this allows a user freedom to use the stiffeners 102,103 in whichever orientation.

Figure 2 shows the system of Figure 1 in more detail since the wall 1 and support surfaces 8,9 are not shown. As illustrated, each stiffener has four side surfaces and in this embodiment, two of the opposing side surfaces 102a,102b,103a,103b (102b and 103b not shown) of each stiffener 102,103 have a plurality of engagement means and in this embodiment, the engagement means are in the form of elongate slots 120 which are arranged along two substantially parallel axes and which extend in a direction substantially parallel to the longitudinal axes of the stiffeners 102,103. Each slot 120 has a respective opening 121 formed near the centre of the slot 120, and first and second recesses 122,123 arranged at either side of the opening 121 and which extend in a direction opposite to the opening 121.

To extend the effective length of the vertical or horizontal stiffeners, the sleeve members 130,135 are used and which are also fabricated from pre-galvanised steel in the same manner as the stiffeners 102, 103. Both sleeve members 130,135 are the same and thus, only one will be described in relation to the vertical stiffener 102. The sleeve member 130 also includes engagement means in the form of slots 131 having an opening 132 and recesses 133,134 which are similar in shape and configuration as the slots 120 of the elongate member 102. Just like the stiffener 102 the sleeve member 130 of the present embodiment also has the slots formed on two opposing side surfaces 130a,130b (103b not shown). Thus, the sleeve member 130 are generally similar in construction as the stiffener 102 except that the cross-sectional perimeter of the sleeve member 130 is less than the cross-sectional perimeter of the stiffener 102 so that a sleeve member 130 is slidably receivable within a

stiffener 102 (at both ends). The effective length of the stiffener 102 is then extended by sliding the sleeve member 130 such that a desired effective length is reached.

- 5 The configuration of the slots 120,131 will now be explained using an enlarged and exploded view of the region A of Figure 2 and this is shown in Figure 3. For simplicity of explanation, reference is made to the slots 120 of the vertical stiffener as an example but it will be understood that this also applies to the slots 131 of the sleeve member 130. Referring to Figure 3 and 2, each of the
- 10 slots 120 of the stiffener 102 along the same vertical axis are spaced from each other in a predefined manner. However, each slot 120 along one axis is offset from adjacent slots 120', 120" along the other substantially parallel axis such that a first and second recesses 122,123 of the slot 120 is aligned with one recess of each adjacent slot 120', 120". Specifically, the first recess 122 is
- 15 aligned with a second recess 123' of an adjacent slot 120' to form a first recess pair 126 as shown in Figure 3. In the same way, the second recess 123 of the slot 120 is also aligned in the same manner as the first recess 122" of the slot 120" to form a second recess pair 128. The location of the recesses 122,123 along the slot 120 and the slot's length are strategically selected, the reason of
- 20 which will become apparent later.

Figure 10 shows a rear perspective view of the tie 7 which includes a planar section 20 having two lugs 21 formed thereon. It can be seen that the lugs 21 extend both rearwardly and to the side of the planar section 20. The lugs 21 are

25 arranged to be inserted through openings 121,121' to engage with slots.

120,120' in the side wall of the stiffener 102 to attach the tie 7 thereto. The length of the slots 120,120' is greater than the length of the lugs 21 to permit movement of the tie 7 and therefore, adjustment of the position of the tie 7 with respect to the stiffener 102. The planar section 20 of the tie 7 is connected to a
5 ribbed section 23. The ribbed section 23 has a rib formation 25. The ribbed section 23 makes an angle of approximately 90° with the planar section 20, such that when the lugs 21 are inserted into the slots 120,120', the ribbed section 23 of the tie 7 extends substantially perpendicularly to the side wall of the stiffener 102.

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Figure 13 depicts different views of a variation 7' of the tie member. The tie member 7' is also generally L-shaped with a planar section 20 connected to an extended section 23'. The tie member 7' also has lugs 21' to engage to the slots 120 of the stiffeners 102,103. However, unlike the example shown in Figure 10,
15 the extended section 23' does not have a rib formation 25. Instead, perforations 27 are formed on the extended section 23' and in this example, the perforations 27 formed the word Stiflex™ in different representations (see view A of Figure 13). This variation 7' is particularly useful where joints between layers of bricks are thinner than the height of the rib formation 25, for example, when other
20 adhesives are used instead of cement mortar. The presence of the perforations 27 allows the adhesive to adhere more readily to the tie member 7' and thus the tie member 7' can engage the wall better.

Turning now to the base plate 110, this is shown in enlarged and exploded
25 views (from different directions as indicated by Views A, B and C) in Figure 4. A

description of how the base plate 110 is connected to the stiffener 102 will now be explained.

In this embodiment, the base plate 110 is press-formed from pre-galvanised steel and includes a generally flat member 112 and connection means in the form of two pairs of substantially L-shaped angled projections 114,116, each pair being of different lengths and are spaced apart according to the width of stiffener 102,103 and sleeve members 130,135. The base plate 110 also includes stoppers 118a, 118b,119a,119b each arranged at one end of respective angled projections 114,116 such that the stoppers are disposed at the ends between the two projection pairs 114,116. Each pair of projections 114,116 includes opposing lugs 114a,114b,116a,116b which faces inwards to each other and are arranged to be received in respective recess of the recess pair 126 (or 128) of adjacent slots formed on respective side surfaces 102a,102b of the stiffener 102,103. In this respect, Figures 5a to 5d shows how one base plate 110 mates with an end of one stiffener 102 (which is shown at an angle merely for the purposes of illustrating the connection process although in use, this is not necessary so).

As shown in Figure 5a and using the drawing of Figure 3 as reference, the stiffener 102 is selectively cut, either on site or from the factory, such that the distance of the recess pairs 128 from the edge 102e matches the effective height of the projection pairs 114,116. It should be apparent that although Figures 5a to 5d illustrate only one side surface 102a, the recess pair of adjacent slots 120 on the other side surface 102b are also arranged in the same

manner as the side surface 102a shown in the figures. The base plate 110 is first held at an acute angle with respect to the edge of the stiffener and with the projections 114,116 facing towards the stiffener 102 as shown in Figure 5a, the base plate 110 is brought towards the stiffener in the direction X so that the lugs 116a,116b of the longer angled projections 116 slides into corresponding recesses of recess pair 128b (the suffix "b" to represent the hidden recess pair) from the inner surface of the other side surface 102b of the stiffener 102, as shown in Figure 5b.

10 With the lugs 116a,116b slidably engaged with the recess pair 128b, further movement of the plate 110 along the direction X is guided by the sliding engagement until the side surface 102b abuts against the stoppers 119a,119b disposed at ends of the longer projections 116. Next, the plate 110 is brought in full contact with the edges of the stiffener 102 as shown in Figure 5c. At this point, the side surface 102a is beyond the engaging lugs 114a,114b of the shorter projection 114 and thus, sliding the plate in the direction of arrow Y allows all the lugs 114a,114b,116a,116b to be received in the recess pairs 128,128b of the side surfaces 102a,102b. With this, the plate 110 is appropriately connected to the stiffener 102 as shown in Figure 5d. Figure 6 is a view from the direction AA showing more clearly how the projections 114,116 engages respective recess pairs 128,128b. In this position, it would be appreciated that any lateral sliding movement along the axis Z parallel to the longitudinal axis of the base plate 110 would not disconnect the plate 110 from the stiffener 102 but only if the plate 102 is lifted away from the stiffener when the plate is slid such that the side surface 102a is beyond the shorter projection

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114 as shown in Figure 5c. Thus, reversing the steps shown in Figures 5a to 5d disconnects the plate 110 from the stiffener.

A feature of the preferred embodiment is that the base plate 110 is selectively
5 connectable releasably with the stiffener 102 as explained above or to the
sleeve member 130. Since the base plate 110 can be connected to either the
sleeve member 130 or the stiffener 102, the user assembling the support
member system 100 can decide when the base plate 110 is to be connected to
the stiffener 102, for example, when fixing to a lower support structure such as
10 the lower support 9 of Figure 1, the base plate 110 can be connected directly to
the lower end of the vertical stiffener 102. Direct connection would thus reduce
the number of sleeve members 130 required. On the other hand, when the
effective length of the vertical stiffener needs to be extended towards a upper
support structure such as the upper support 8 of Figure 1, the base plate 110 is
15 connected to a sleeve member 130 and the sleeve member 130 inserted within
the upper end of the vertical stiffener 102. This affords greater flexibility to the
end user. Having the base plate 110 separated from the sleeve member 130 is
particularly advantageous from a manufacturing standpoint since each part can
be produced separately thus improving productivity. In terms of logistics, each
20 part can be packed separately for shipment thus saving space.

Selecting whether to connect the base plate 110 to either the stiffener 102 or to
the sleeve member 130 also applies when the stiffener is used in a horizontal
orientation, in the case of the horizontal stiffener 103 of Figure 2. Instead of
25 ordering stiffeners of different lengths, the present system affords the flexibility

of ordering stiffeners of a common length (thus easier to manage) and the effective length of each stiffener extended using the sleeve members 130, if necessary. Thus, when a horizontal stiffener 103 is not long enough (such as that shown in Figure 2), a sleeve member 135 is inserted therein to extend the stiffener's effective length. The configuration of the horizontal sleeve member 135 is the same as that of the "vertical" sleeve member 130 and the difference in reference numerals is for ease of explanation. Normally, the use of a horizontal sleeve member 135 is only required at one end of the stiffener and thus, the other end of the stiffener can be directly connected to a base plate 110. If the base plate 110 is to be mounted to an adjacent vertical stiffener, a side base plate 111 is required which is a variation of the base plate 110 and this is shown in Figure 7 which has different views of the base plate variation.

In general, the side base plate 111 is similar in design as the base plate 110 (and thus similar parts have similar reference signs with a prime') except that the side base plate 111 includes a rear attachment section in the form of four rear lugs 117 . which are arranged in accordance with the positions of the openings 121 of the slots 120 on the stiffener. The lugs 117 are formed by punching out sections of the plate 111' to form the lugs 117 which extend rearwardly behind the plate 111'. This permits the rear surface of the plate 111' to be placed against the side surface of the stiffener 102 and the lugs 117 inserted through the respective openings 121. (in this case, four openings of four slots) to engage in respective slots 120 so as to attach the plate 111' (and therefore the sleeve member 135) to the vertical stiffener 102, and so couple the horizontal stiffener 103 to the vertical stiffener 102.

It should be pointed out that in the present embodiment, the vertical base plate 111 is preferably used only at one orientation i.e. with the shorter projections 114' at the top. With this orientation, the side surface 135a of the sleeve member 135 (see Figure 2) abuts against the stoppers 118a', 118b' while the other surface 135b of the sleeve member 135 remains engaged with the respective recesses on the other surface 135b due to the length of the longer projections 116'. Thus, the base plate 111 remains slidably engaged with the sleeve member 135. If the orientation is reversed (i.e. with the longer projection 116' at the top), the side surface 135b will slide beyond the shorter projections 114' and thus this is not preferred.

As explained above, the length of the stiffener 102, 103 (and also the sleeve member 130, 135) is selectively cut so that the stiffener or the sleeve member can mate with the projections of the base plate 110, 111. As is apparent from the slots shown in Figures 2 and 3, The arrangement of the slots 120, 131 on the stiffener 102, 103 and the sleeve member 130 are strategically offset from each other so that two opposing recesses from adjacent slots 120 are aligned with each other as explained above. In the preferred embodiment, the spacing between slots 120 along the same vertical axis is 100mm, and the length of each slot is chosen so that it can be used as a guide to cut the stiffener 102, 103 or the sleeve member 130, 135 so that these are suitable to be connected to the base plate 110, 111. As is apparent from Figure 6, each end of the slot 120, as shown using arrows BB and CC, serves as an indicator for cutting the sleeve member 130, 135 and when cut, the distance of the recess pair 128 from the cut

edge will be suitable for mating with the projections 114,116,114',116' of the base plate 110,111. This provides a significant advantage since longer sleeve members (or even stiffeners) can be ordered and the user then cuts the sleeve members to size depending on application. If the stiffeners ordered are too short for supporting a wall (or if the stiffeners are ordered by mistake), the user can order longer sleeve members to be cut to size according to the particular project. This allows greater flexibility to users of the support member system.

In use, the stiffeners 102,103 are installed by first installing the vertical stiffener 102. The vertical stiffener 102 is installed by inserting the base plates 110 to either the stiffener 102, 103 or the sleeve member 130,135. Depending on the height of the wall to be supported, typically, the length of the vertical stiffener 102 is chosen to be nominally shorter than the height of the vertical gap into which the stiffener has to fit and difference is compensated by the sleeve member 130 to ensure that the combination of the sleeve member 130 and stiffener 2 extend from the lower support surface 9 to the upper support surface 8 (using Figure 1 as an example).

Firstly, the base plate 110 is first connected to one end of the sleeve member 130 in the manner explained earlier. Secondly, the sleeve member 130 with the upper base plate 110 connected is inserted into the top end of the hollow vertical stiffener 102. Next, the bottom end of the vertical stiffener 102 is directly connected to a lower base plate 110 in the manner explained earlier. When the stiffener 102 is erected in the correct position, fasteners are driven through the holes (not shown) in the lower plate 110 to secure the plate 110 (and thus the

lower end of the vertical stiffener 102) to the lower support 9. Depending on the clearance, the sleeve member 130 is withdrawn from the vertical stiffener until the upper base plate 110 contacts the upper support 8. It would be apparent that the length of the sleeve member 130 is chosen such that when the upper
5 base plate 110 contacts the upper support 8, a portion of the sleeve member 130 remains inserted in the stiffener 102. Again fasteners are used to attach the upper base plate 110 fixedly to the upper support 8 and thereby retain the vertical stiffener 102 in the correct position.

10 After the vertical stiffener 102 has been installed, the wall 1 is constructed and tie members 7 are mounted at appropriate intervals (typically every 300 to 400mm vertically) to engage with the slots 120 on the side surfaces of the vertical stiffener 102 such that the ribbed section 23 is mechanically locked to the wall 1 by the ribbed section 23 being located between layers of bricks and
15 held by the cement mortar between the layers. When the lower portions 4,5 are constructed to a level where the horizontal stiffener 103 is required, the last layer of bricks is completed except for the two end bricks adjacent the vertical stiffener 102. The side plate 111 is inserted to an end of the horizontal stiffener 103 that is to be connected to the vertical stiffener 102 whereas the other end is
20 inserted with a base plate 110 since the other end is connected to a side support structure such as a column. The base plate 110 is similarly fastened to the column as explained above whereas, the lugs 117 in the side plate 111 are inserted into the slots 120 of the adjacent vertical stiffener 102 to mount the horizontal stiffener 103 onto the last layer of bricks. Each end brick is then laid.
25 Continuation of construction of the wall 1 above the horizontal stiffener 103 then

continues by construction of the wall portion 6 above the horizontal stiffener 103, with ties 7 inserted along the side surfaces 102a,102b of the stiffener 102 and/or the side surface 130a,130b of the sleeve member 130 at appropriate intervals to engage between the adjacent layers of bricks to tie the wall portion
5 6 to the vertical stiffener 102.

It should be apparent that the tie members 7 can similarly be engaged to the slots 120 on the side surface 103a of the horizontal stiffeners 103 (and the sleeve member 135) to engage between adjacent layers of bricks as the wall
10 portion 6 is being constructed.

It can be appreciated from the example above that sleeve member 130,135 is used to extend the effective length of the stiffeners 102,103. It will be noted that the sleeve member 130,135 need not be fully inserted into each respective
15 stiffener 102,103 and this enables the stiffeners 102,103 to support wall portions that are higher/longer than the length of the stiffeners 102,103. It is only necessary for a portion of the sleeve member 130,135 to be maintained within with the stiffener 102,103 and the minimum engagement portion required for each stiffener assembly is calculated based on geometry and loading
20 considerations.

Therefore, the preferred embodiment has an advantage of providing a support member system in which the length of the stiffeners 102,103 do not have to be specially manufactured for each application.

Figure 8 shows the flexibility of the support member system 100 of the preferred embodiment of the present invention for supporting different masonry wall structures 150 with concrete columns 160. It should be noted that the system 100 is depicted in simplified form without the slots 120, the base plates 110 or
5 the sleeve members 130 for ease of showing the flexibility of the system.

It should also be apparent that the stiffeners 102,103 can have different shapes other than a rectangular box construction as shown by the elbow shaped obtuse angle stiffener 152. When the stiffener 102 is installed as an end or junction
10 stiffener 153, it is preferred to use a corner base plate 154 which is a variation of the base plate 110 and an example of which is shown in Figure 9 and includes views from different angles. Projections 155,156 are similar in shape and configuration as the projections 114,116 of the base plate 110, although the projections 155,156 can be of the same size. Also, there is no need for the use
15 of stoppers, but the plate 154 is bent at an end 157 as shown in Figure 9 which functions like a stopper. The corner base plate 154 is used when installing the end stiffener 153 to support the wall section 158 such that the bent end 157 abuts against the free side surface of the stiffener 153 as indicated by arrow DD in Figure 8.

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Figure 11 is a top view of a variation 160 of the side plate 111. The variant side plate 160 has projections 161,162 and stoppers 163,164 similar in construction as the projections 114',116' and stoppers 118',119' of the side plate 111. The variant side plate 160 also has lugs 165 formed rearwardly providing the same
25 function as the lugs 117 of the side plate 111. However, it would be apparent

(by a comparison between Figure 11 and View C of Figure 7) that a difference is that in the variant plate 160, the projections 161, 162 are off centre of the plate 160. This variation is particularly useful when supporting wall sections that are not aligned and an example of which is shown in Figure 12 (the stiffeners 102, 103 are shown in simplified form for ease of explanation). As illustrated, one side surface of the vertical stiffener 102 is used to support a first wall section 170 and the other side surface of the vertical stiffener 102 is arranged to support a second wall section (not shown in order to show the horizontal stiffener 103). However, the first and second wall sections are offset from each other and thus, the plate 160 can be used to connect the horizontal stiffener 103 to the vertical stiffener 102 and yet carry out the function of supporting the second wall section. It should be apparent that the relative positions of the projections 161, 162 and the lugs 165 can be adapted to suit different applications.

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Figure 14 shows another application of the variation side plate 160. As illustrated as a plan view, one side surface 102f of the vertical stiffener 102" is used to support a first wall section 170' and the other side surface 102g of the vertical stiffener 102" is arranged to support a second wall section (not shown in order to show the horizontal stiffener 103"). However, the width of the side surface 102g does not match the width of the horizontal stiffener 103" as can be seen from the figure and thus, if the horizontal stiffener 103" is mounted to the vertical stiffener 102" with the side base plate 111 of Figure 7, the side surface 103h of the horizontal stiffener 103" will not be flushed with the side surface 102h of the vertical stiffener 102". Consequently, using the variation side plate

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160 would alleviate the above problem so that, after engagement, the horizontal stiffener 103" is offset of the central axis of the vertical stiffener 102 but allows the side surfaces 103h to be flushed with the side surface 102h of the vertical stiffener 102".

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The described embodiment is not to be construed as limitation. For example, in the preferred embodiment, only two of the four side surfaces of the stiffeners 102,103 and sleeve members 130,135 have the slots 120. This is not necessary so and the other two side surfaces can also be incorporated with the slots 120 so that the other two side surfaces can also be used to support a wall depending on application. The size and dimension of the vertical and horizontal stiffeners 102,103 need not be the same although this is shown to be so in the described embodiment. Depending on the wall to be supported, the size and dimension of the stiffeners 102,103 can vary as can be appreciated from Figure 8. Consequently, although the described embodiment depicts slots arranged along two parallel axes, but will be apparent that more slots arranged along further axes (need not be parallel) could be provided depending on the size of the side surfaces of the stiffener or sleeve member.

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20 The preferred embodiment shows the horizontal stiffener 103 being mounted to a side surface 102a of the vertical stiffener 102 but the horizontal stiffener 103 can also be mounted to the sleeve member 130 since the sleeve member 130 also has the slots 120 to engage with the rear lugs 117 of the side base plate 111, although normally, the horizontal stiffener 103 is more likely to be mounted to the vertical stiffener 102 rather than to the sleeve 130.

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In the preferred embodiment, the base plate 110 is selectively connectable to the stiffener 102,103 or to the sleeve member 130,135 but the base plate 110 may be adapted to be releasably connectable to just the sleeve member
5 130,135. This would provide the advantage of faster production since each part can be produced separately, but not the flexibility of being able to be connected to the stiffener directly. When the stiffener is used in a vertical orientation, the lower end can then be connected to a conventional base plate, although this is not preferred. Further, the sleeve member 130 can be configured to be
10 insertable only in one end of the vertical and/or horizontal stiffener 102,103 although it is preferred for the sleeve member to be selectively insertable in either end.

Of course, the base plate 110 may be adapted to be connectable only to the
15 stiffener.

The preferred embodiment shows the sleeve member 130,135 being insertable and receivable within the stiffener 102,103. However, this is not necessarily so and other releasable attachments are envisaged (eg. the stiffener is receivable
20 within the sleeve members).

Further, the base plate 110 has two short and two long projections but it is envisaged that just one of each is sufficient although the mating with the recesses of the stiffener or the sleeve member would not be as good as if pairs
25 of projections are used. The orientation of the aligned recess pairs 126,128 of

the slot 120,120', 120" faces inwards towards each other. However, it is envisaged that the recess pairs can also face outwards (in the same direction as the openings of the slots) but it is apparent that lugs of the projection pairs 114,116 need to be modified accordingly. Also, in the described embodiment, the recess pairs 126,128 are shown to be aligned but this is not essential since it is envisaged that the recess pairs 126,128 can also be offset from each other and the projections 114,116 will have to be modified accordingly (i.e. one set of projection could be higher than the other).

Four lugs 117 are shown in the side plates 111,160 but it should be understood that more/less lugs could be provided depending on the dimension of the side surface (and the configuration of the slots 120) of the vertical stiffener 102 to which the side plates 111,160 are to be attached.

After the base plate 110 are connected to the sleeve member 130,135 or the stiffener 102,103, the base plate 110 can be fixedly connected thereto by any suitable means.

Having now fully described the invention, it should be apparent to one of ordinary skill in the art that many modifications can be made hereto without departing from the scope as claimed.

CLAIMS

1. A support member assembly comprising
an intermediate assembly including a single elongate support member
5 having an effective length, and an elongate member engagement portion
arranged to engage with one end of the elongate support member to
extend the member's effective length; and
a base portion adapted for connecting to the intermediate assembly, the
base portion including connection means for releasably connecting to the
10 elongate member engagement portion or to the elongate support
member, wherein the elongate support member and the elongate
member engagement portion each has a side wall adapted to be located
adjacent an end of a wall to be supported, in use.
- 15 2. A support member assembly according to claim 1, wherein the
connection means is adapted to be connectable only to the elongate
member engagement portion.
3. A support member assembly according to claim 1 or 2, wherein each
20 side wall includes a plurality of engagement means which permit a tie
member to be mounted on the side wall, the tie member having a portion
projecting from the side wall to engage with the wall to be supported.
4. A support member assembly according to claim 3, wherein the plurality
25 of engagement means are provided at discrete locations along the side

walls of the elongate member and the elongate member engagement portion such that position of the tie members are adjustable.

5. A support member assembly according to claim 3 or 4, wherein the engagement means is provided on opposite sides of the elongate member.
5
6. A support member assembly according to any of claims 3 to 5, wherein the engagement means is provided on opposite sides of the elongate member engagement portion.
10
7. A support member assembly according to claim 3 or 4, wherein the engagement means is provided on all four sides of the elongate member.
- 15 8. A support member assembly according to any of claims 3, 4 and 7, wherein the engagement means are provided on all four sides of the elongate member engagement portion.
9. A support member assembly according to any of claims 3 to 8, wherein the engagement means comprises slots.
20
10. A support member assembly according to claim 9 wherein the slots are elongated and comprises an opening extending in a first direction substantially perpendicular to the longitudinal direction of the slots.

11. A support member assembly according to claim 10, wherein the opening of each slot permits a tie member to be mounted on the side wall, the tie member having a portion projecting from the side wall to engage with the wall to be supported.
- 5
12. A support member assembly according to any of claim 10 or 11, wherein the slots are arranged along at least two substantially parallel axes along the longitudinal axis of the elongate support member and the elongate support member engagement portion with the openings of slots along
- 10 one said axis facing in a direction opposite to the openings of slots along the other said axis, the directions of both openings being substantially perpendicular to the longitudinal axis of the elongate support member and the elongate support member engagement portion.
- 15 13. A support member assembly according to claim 12, wherein a said slot comprises two recesses extending in a direction opposite the direction of the opening of a said slot.
14. A support member assembly according to claim 12 or 13 wherein, a said
- 20 slot along one axis is offset from an adjacent slot along the other axis such that the openings of the slots are not aligned with each other.
15. A support member assembly according to claim 14, wherein a said recess of the said slot is aligned with a recess of the adjacent slot
- 25 despite the offset.

16. A support member assembly according to claim 15, wherein the position of each slot is used as a guide for selectively cutting the elongate member or the elongate member engagement portion to a desired length.
17. A support member assembly according to claim 16, wherein when the elongate member or the elongate member engagement portion member is cut in accordance with the cutting guide, the aligned recesses of the adjacent slots are arranged to be connectable with the connecting means of the base portion.
18. A support member assembly according to any of claims 13 to 17, wherein the connection means includes projections arranged to engage selectively at least one of the recesses of a slot.
19. A support member assembly according to claim 17, wherein the connection means includes projections arranged to engage respective aligned recesses.
20. A support member assembly according to claim 18 or 19, wherein the projections are angled to form generally L-shaped projections.

21. A support member assembly according to claim 19 or 20, wherein the projections comprises two projection pairs, a pair of which is longer than the other pair.
- 5 22. A support member assembly according to claim 21, wherein one projection pair is arranged to connect with one side surface of the elongate support member and the other projection pair is arranged to connect with the opposing said surface of the elongate support member.
- 10 23. A support member assembly according to claim 22, wherein one projection pair is arranged to connect with one side surface of the elongate member engagement portion and the other projection pair is arranged to connect with the opposing said surface of the elongate member engagement portion.
- 15 24. A support member assembly according to claim 22 or 23, wherein the base portion includes stoppers arranged to abut against a side surface of the elongate support member or the elongate member engagement portion to limit movement along one direction.
- 20 25. A support member assembly according to any of the preceding claims, wherein the base portion is arranged to engage with a support structure.
- 25 26. A support member assembly according to claim 25, wherein the base portion includes a bent edge.

27. A support member assembly according to any of claims 1 to 24, wherein the base portion is arranged to engage with a said elongate support member.

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28. A support member assembly according to claim 27, wherein the base portion has an attachment section for attachment to a side wall of one of the elongate members.

10 29. A support member assembly according to claim 28, wherein the attachment section includes lugs.

30. A support member assembly according to any of the preceding claims, wherein the support member engagement portion is engageable with
15 both ends of the elongate member.

31. A support member assembly according to claim 13, wherein a said slot comprises two recesses extending along the same direction as the opening of a said slot.

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