Installation Guideline for TensarTech® Stratum® Cellular Foundation Mattress

This Installation Guideline provides a step-by-step guide intended for use by Contractors planning to construct a cellular foundation mattress using the TensarTech® Stratum® system.

The standard TensarTech Stratum mattress will have a depth of 1.0m. Mattress depths of 0.5m, 0.65m and 1.3m are also possible.

Installation

1. To form the base of the mattress roll out the specified Tensar TriAx® geogrid in lengths parallel to the embankment centreline. Provide a 300mm minimum overlap between adjacent lengths. (Figure 1).
2. To form the transverse diaphragms, roll out the specified Tensar Stratum uniaxial geogrid in lengths side by side over the base geogrid, across the width of the embankment and at right angles to the embankment centreline (Figure 1). Lengths of geogrid may be joined to form the transverse diaphragms. Joints should be made using the appropriate Tensar polymer bodkins for the grade of Tensar uniaxial geogrid being connected (Figure 2).

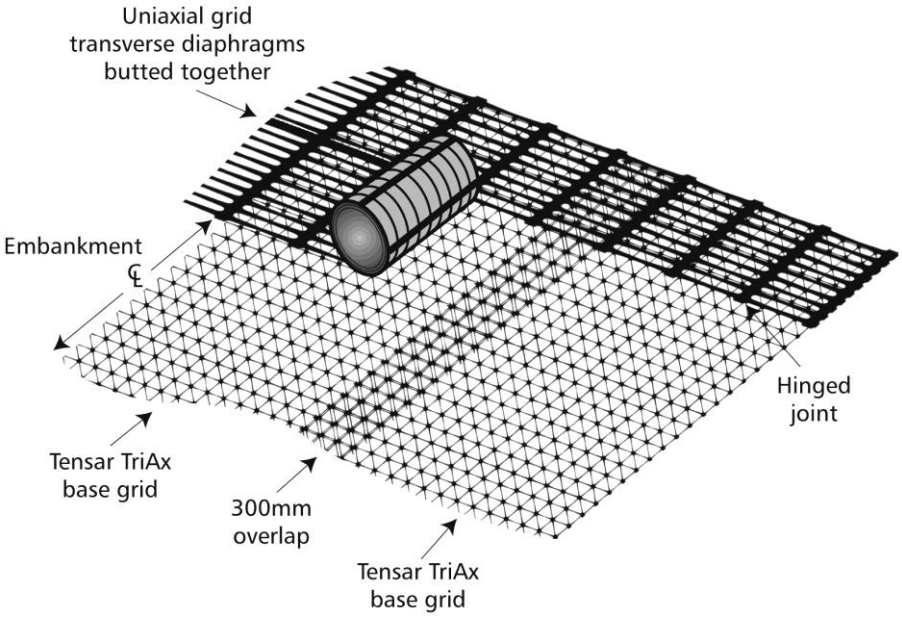


Figure 1

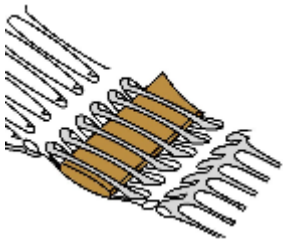


Figure 2

3. Connect one edge of each transverse diaphragm to the base geogrid using braid (Figure 3) or suitable nylon cable ties (for example - type T5OS). Connect every second uniaxial geogrid aperture of the transverse diaphragm to the corresponding transverse rib on the base geogrid. In addition, a full hitch knot is tied at every 2m spacing where braid is used. The loops of braid or cable ties should be located to allow the transverse diaphragms to slide across the base geogrid during the subsequent tensioning operation.

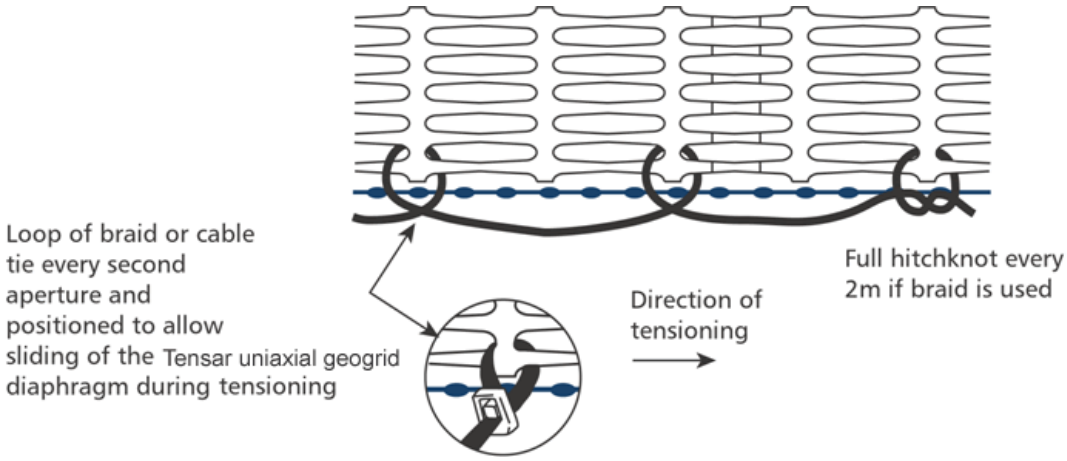


Figure 3

4. Set tensioning posts into the ground at both ends of each transverse diaphragm at least 1.0m from the ends of the diaphragms). Interleave a steel bodkin through alternative geogrid apertures at both ends of each transverse diaphragms. Raise the first transverse diaphragm to a vertical position by rotating around the hinged connections (Figure 4). Anchor at one end to the tensioning post and apply tension from the other end (Figure 5). The maximum length normally tensioned is 30m and intermediate tensioning posts will be required for longer lengths.

   Tension is applied by using simple turnbuckles formed by passing a 300mm length of pipe through the loops of braid connecting the transverse diaphragms to the posts (Figure 5).

   A rod can be threaded through a pair of pipes to maintain tension once applied. It may be necessary to apply tension from both ends of the diaphragm if tensioning from one end only is found to be insufficient.

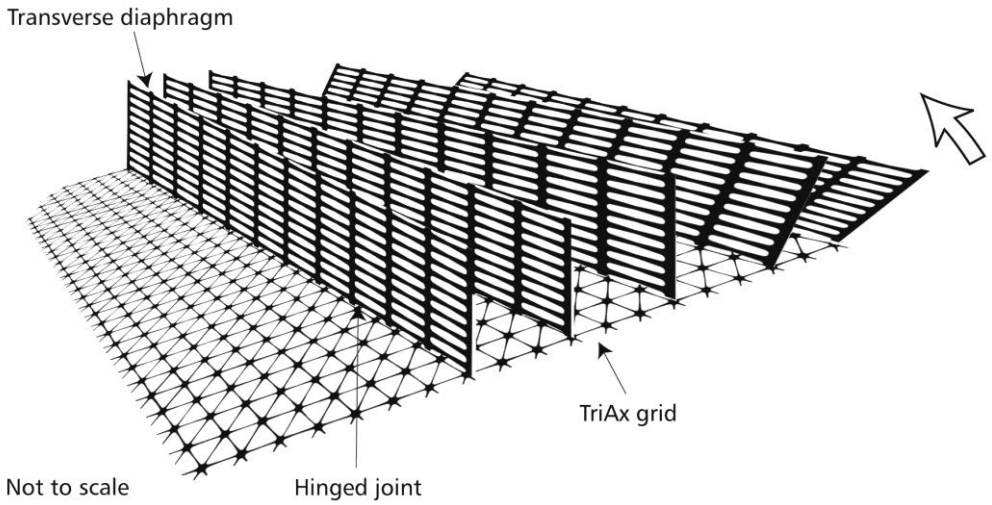


Figure 4

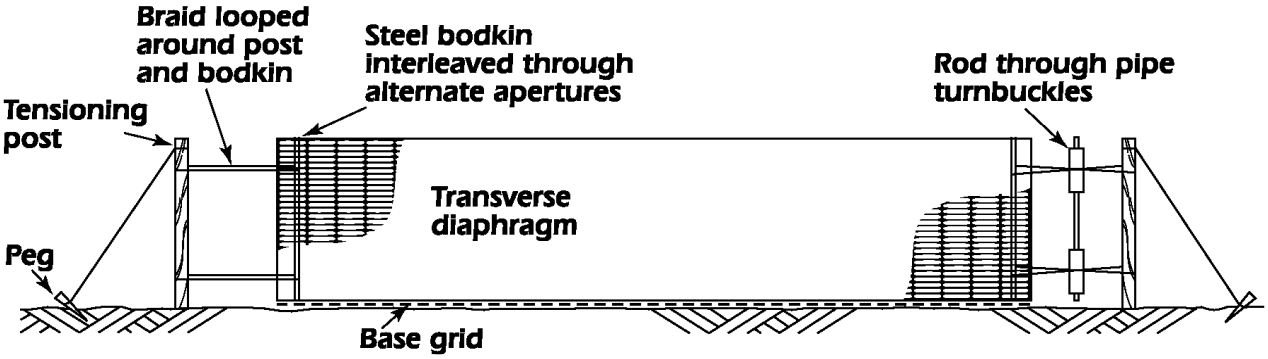
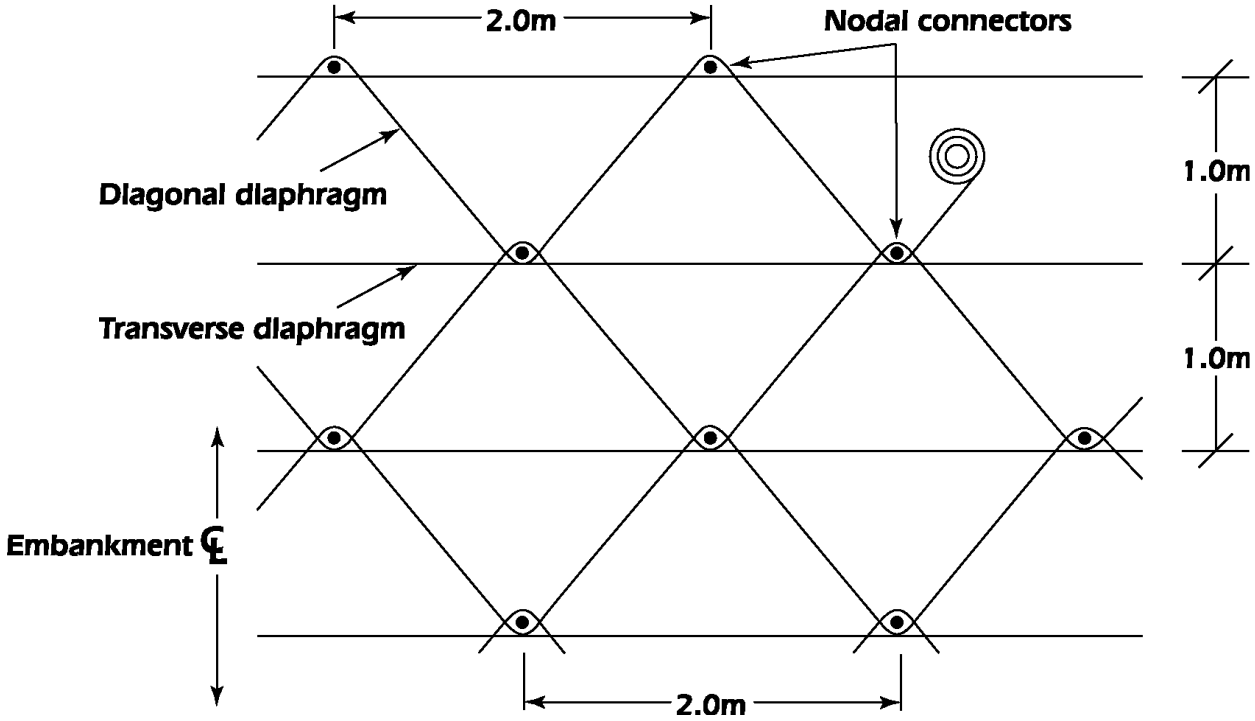


Figure 5

5. To create the 'diamond pattern' in plan shown in Figure 5, mark with chalk or paint along the top edge of the transverse diaphragms spacings of 2 x the diaphragm height (i.e. mark every 2.0m for a 1.0m diaphragm height), offsetting the marks on alternate diaphragms by a distance equal to the diaphragm height (i.e. 1.0m for a 1.0m high diaphragm height).

6. With a roll of Tensar Stratum uniaxial geogrid, work along adjacent transverse diaphragms forming triangular cells with diagonal diaphragms. Each diagonal diaphragm is coupled to a transverse diaphragm at the pre-marked spacings (Figure 5) using a round Tensar HDPE bodkin to form 'nodal connections' (Figure 6). The diagonal diaphragms are NOT attached to the base geogrid.



Diamond cell pattern for a 1.0m diaphragm height TensarTech Stratum mattress

Figure 5

7. A nodal connection coupling is formed by folding a set of ribs of a diagonal diaphragm and pushing them through apertures in the transverse diaphragm to form a loop. A Tensar HDPE bodkin 'nodal connector' (Figure 6) is then pushed into and down through the loops.

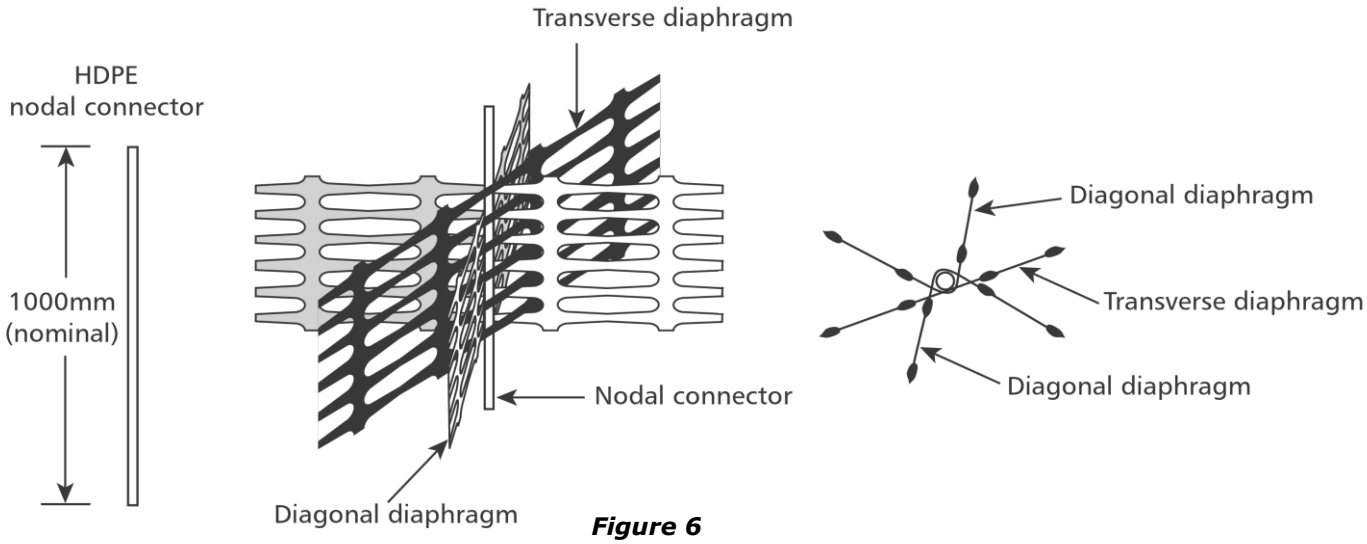


Figure 6

8. **Material required to fill a TensarTech Stratum mattress**

Fill shall be natural gravel, natural sand, crushed gravel, crushed rock other than argillaceous rock, crushed concrete, chalk or well burnt colliery spoil and shall meet the following requirements.

The material shall be well graded, shall have a uniformity coefficient (D_{60}/D_{10}) greater than 5 and lie within the grading requirements in Table 1.

BS Sieve Size	Percentage passing by mass	
	Type a	Type 6F2
125mm		100
90mm	100	80 - 100
75mm	85 - 100	65 -100
37.5mm	85 - 100	45 - 100
10mm	40 - 70	15 - 60
5mm	25 - 45	10 - 45
600µm	8 - 22	0 - 25
75µm	0 - 10	
63µm		0 - 12

Table 1 TensarTech Stratum - Fill grading

The grading of fill Type (a) in Table 1 is regarded as the optimum but the specifier may widen this to Type 6F2 to UK Manual of Contract Documents for Highway works (MCHW), Volume 1 Specifications for Highway works (MCHW1) Table 6/1, if Type (a) is unavailable or uneconomic.

9. **Filling the TensarTech Stratum cells**

Using the approved granular material, fill the first two rows of cells to half height. Then fill the first row to full height. Continue filling, ensuring that the leading row is always half filled before the trailing row is fully filled (Figure 7). Filling may be carried out by mechanical plant operating directly on top of filled cells. It is normal practice for the fill to be placed within the TensarTech Stratum mattress without applying direct compaction. A protective cover of 150mm thickness of compacted fill should be placed over the TensarTech Stratum mattress before trafficking.

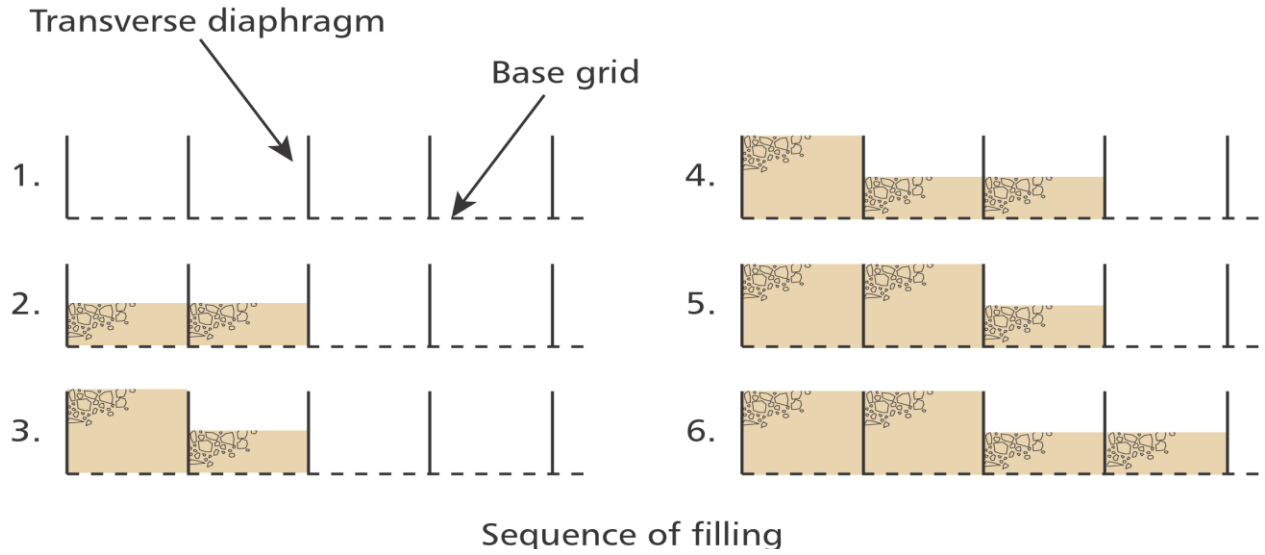


Figure 7 Section showing sequence of filling

10. The tensioning arrangement can be removed once the TensarTech Stratum mattress has been filled.

11. The above installation description is based on a standard 1.0m deep TensarTech Stratum mattress. If the design calls for a 0.5m, 0.65m or 1.3m deep mattress, these are formed in a similar fashion but the appropriate diaphragms, nodal connectors and bodkins will need to be used. These may be cut to size in site from 1.0m or 1.3m size diaphragms and bodkins using a circular saw .

Contact Tensar International if more specific advice is required.

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Tensar International Limited

Tel: **+44 (0) 1254 262431**
Fax: **+44 (0) 1254 266867**
E-mail: **sales@tensar.co.uk**
www.tensar-international.com

UK Head Office
Units 2 - 4 Cunningham Court
Shadsworth Business Park
Blackburn
BB1 2QX
United Kingdom