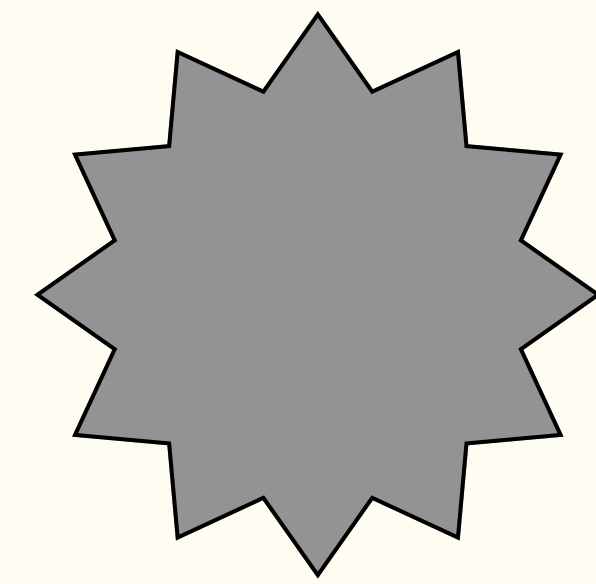


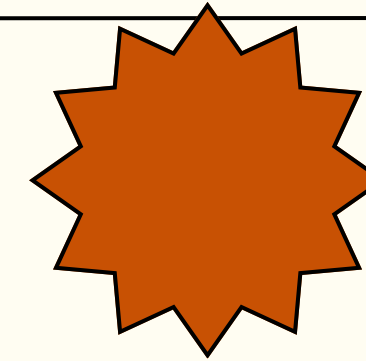


SITE WORK & THE GEOMETRY OF SETTING OUT

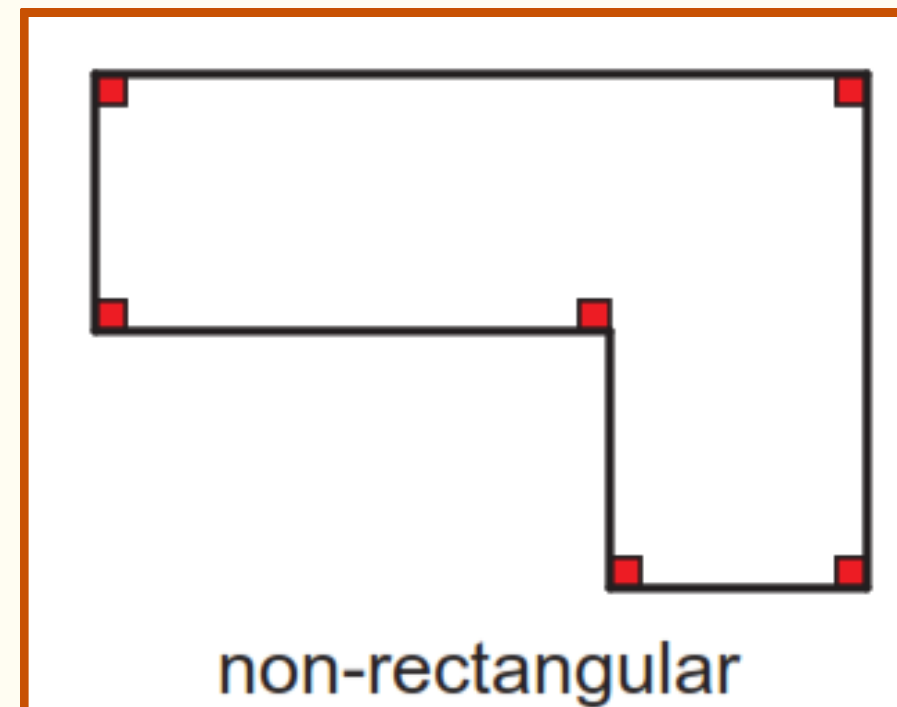
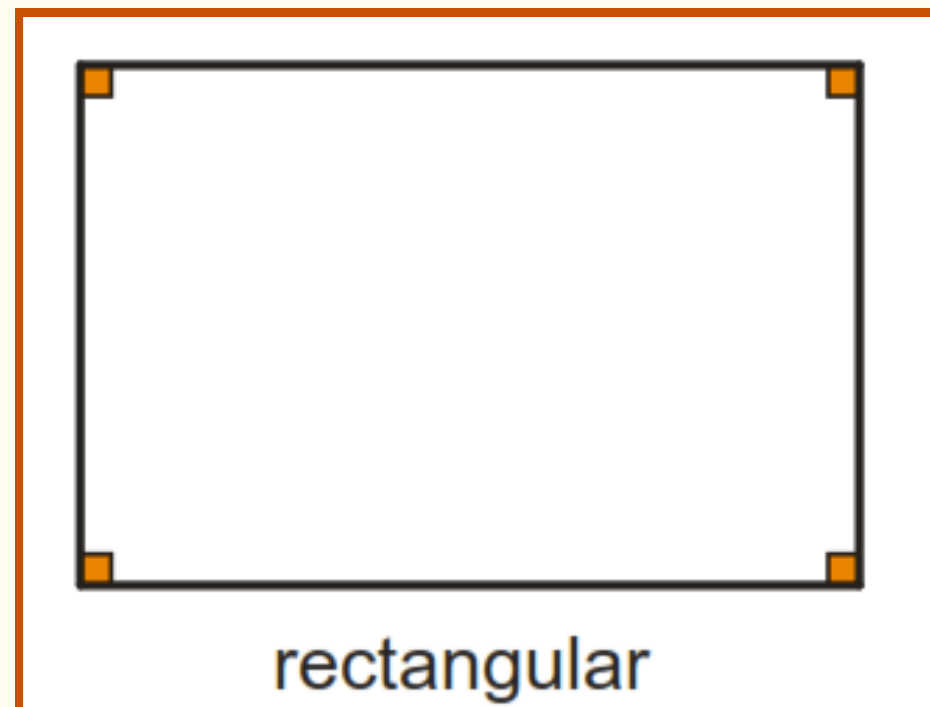
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SETTING OUT

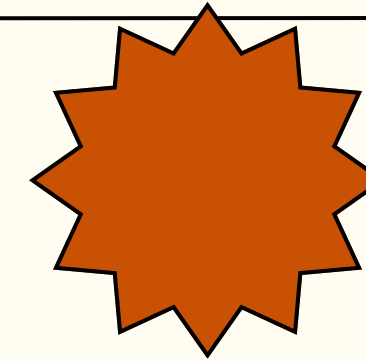


Before beginning the setting out operations, study the working drawings (plans), especially the site plan. This is done to ensure the house is positioned correctly in relation to the stand. Certain by-laws come into play at this early stage, e.g. distance from street (curb), and distance from the two adjoining stands (boundaries).



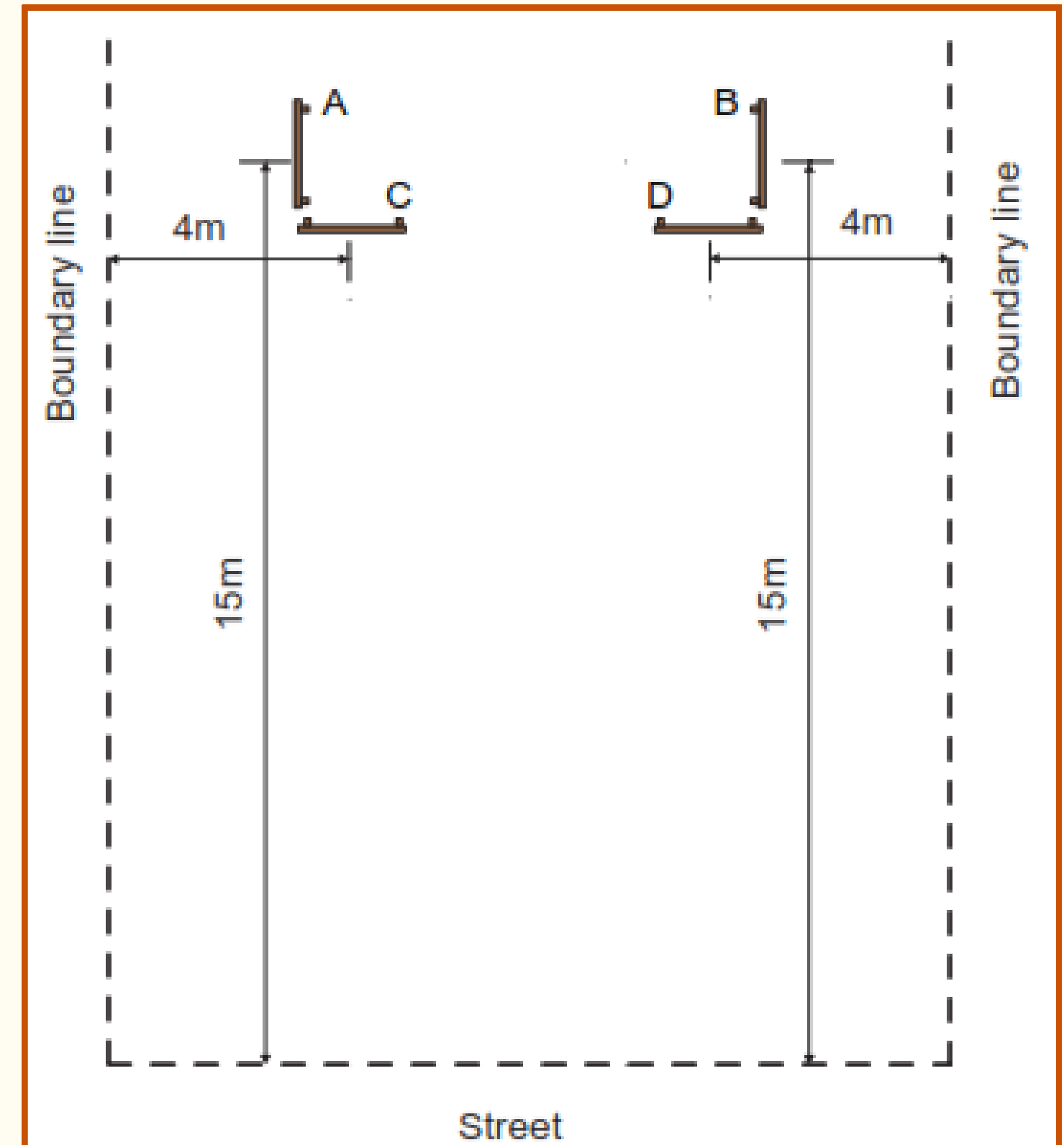
Remember, houses in South Africa normally face North.
Establish the four corner pegs of the proposed structure. In the case of a non-rectangular structure, it will be necessary to locate all the outside corner pegs, as shown below:

SETTING OUT

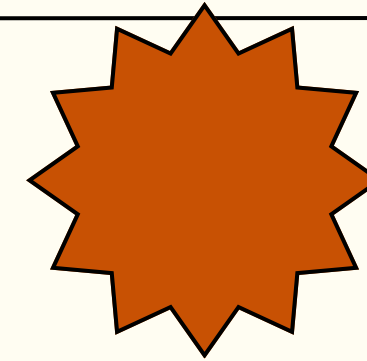


Example:

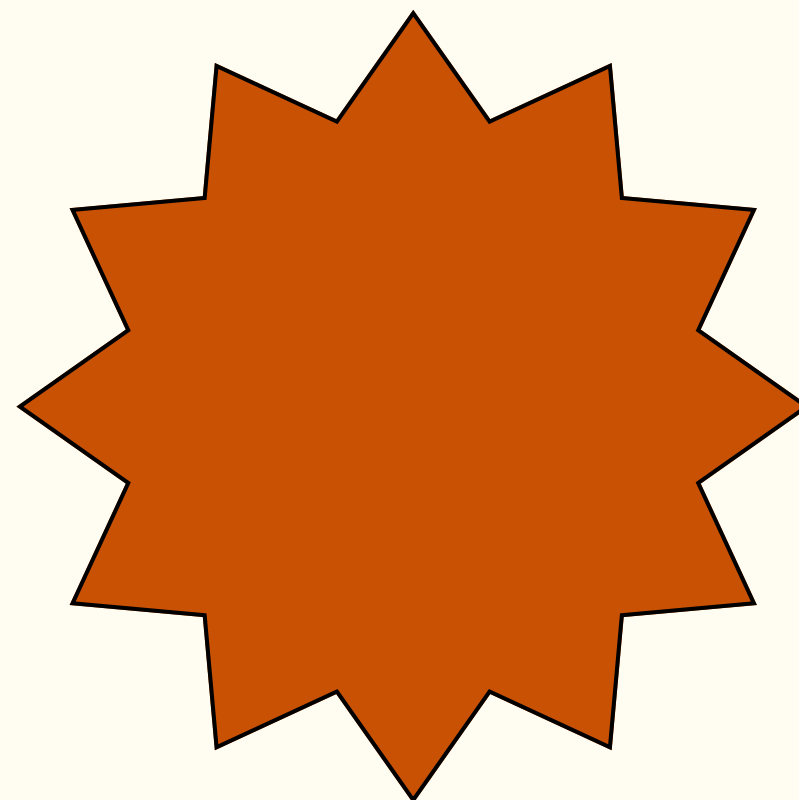
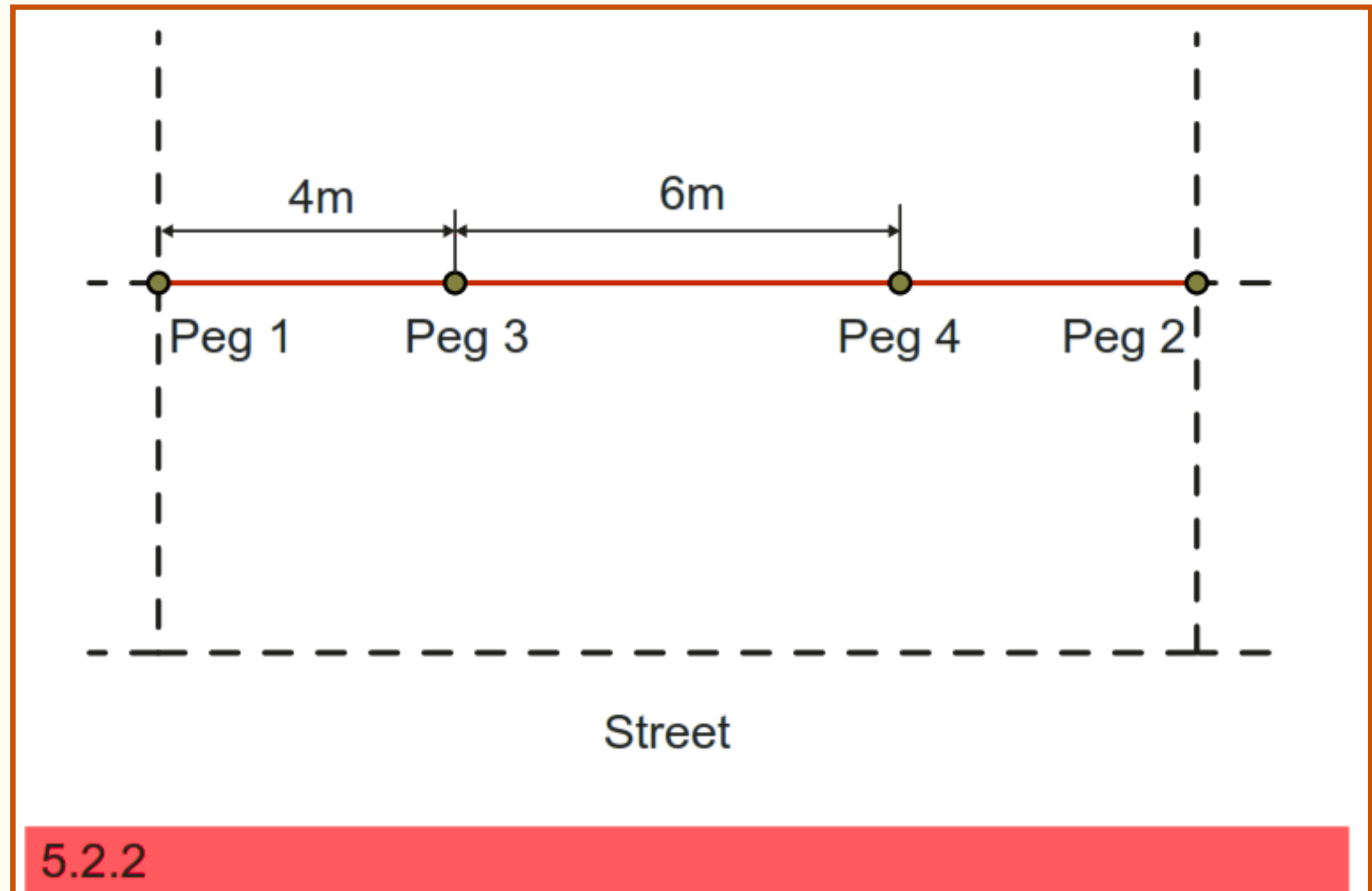
Say the distance from the outside of the building to the street is 15m and 4m on both sides from side boundaries as shown. Put in two pegs.



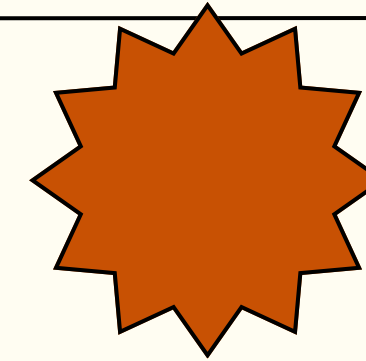
SETTING OUT



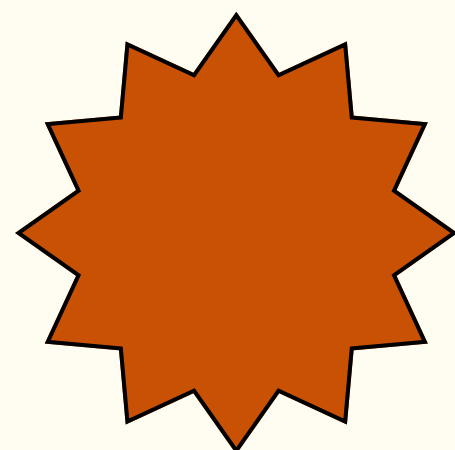
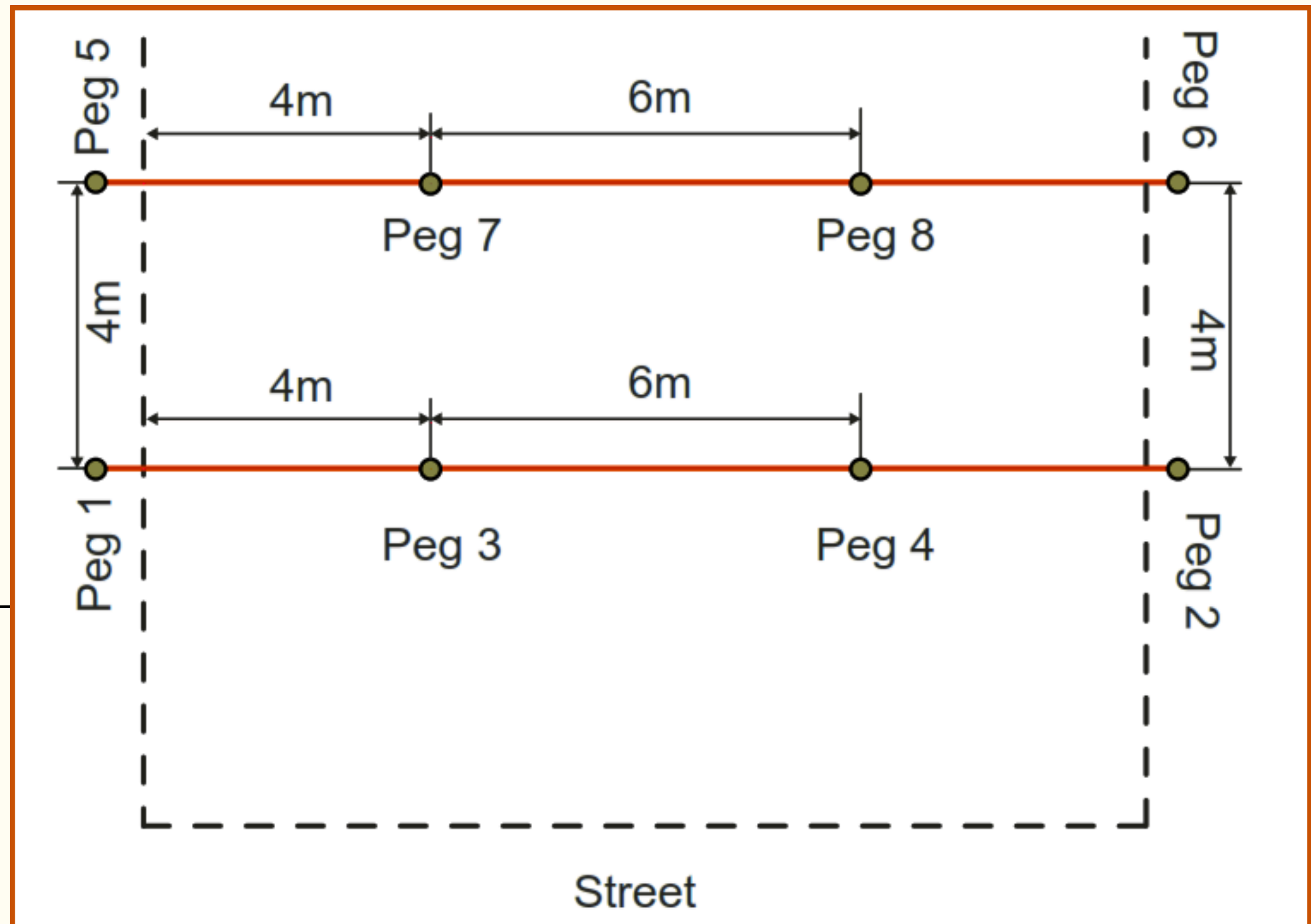
String a line between the two pegs. Pull taut. Say the house is 6m long and it must be 4m from the one boundary line, measure 4m along peg. These are the two front corners of the house.



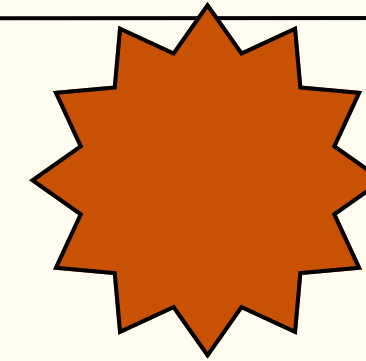
SETTING OUT



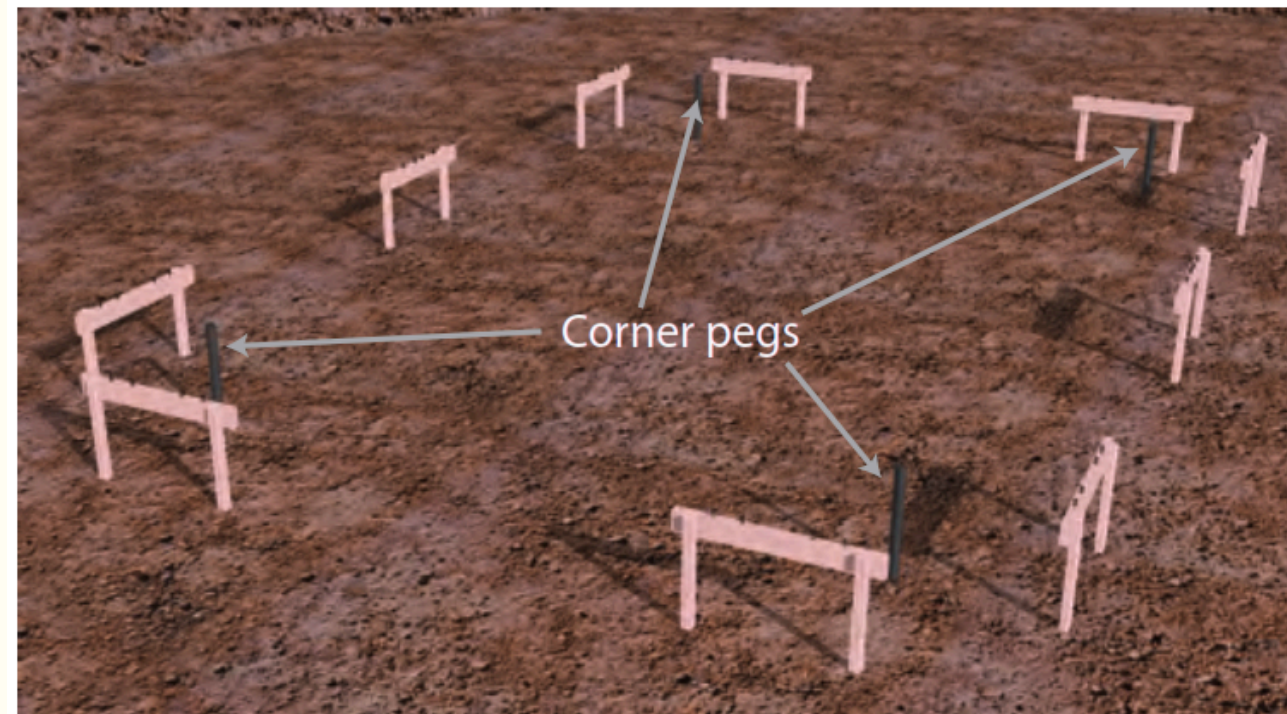
Say the width of the house is 4m.
 Measure back along the boundary 4m. Putting two pegs.
 String a line between these pegs. Measure the first 4m, put in a peg, and then 6m, put in another peg, as shown in Fig. 5.2.3.
 These are the back corners of the house.
 Street



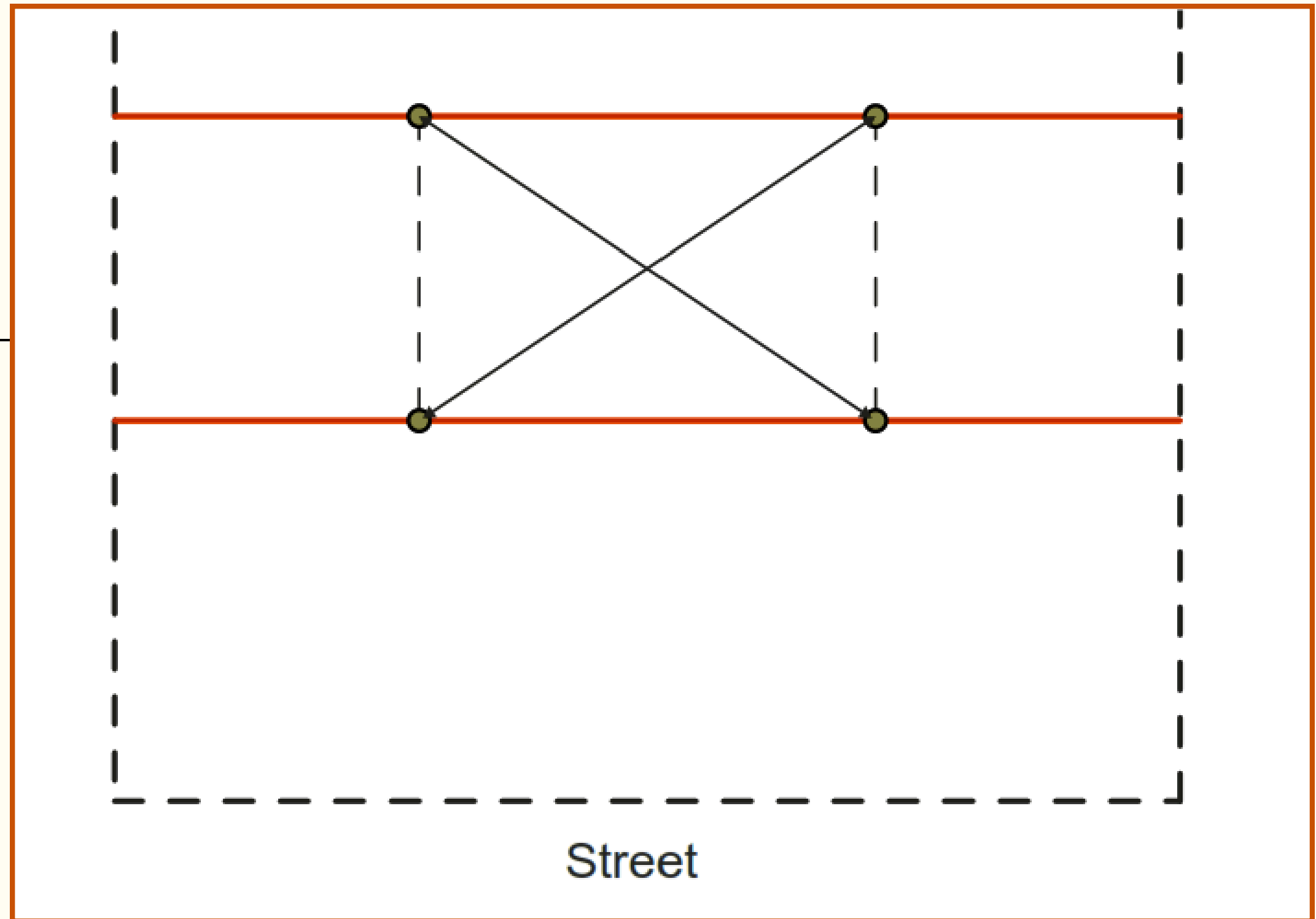
SETTING OUT



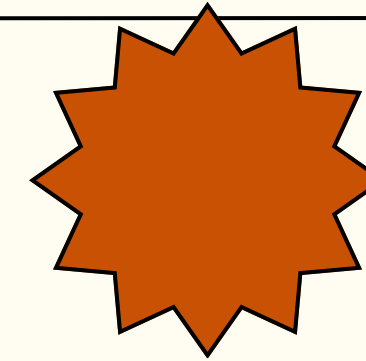
Measure across (diagonally) from each front corner to the back corner on the other side. The distance must be the same. If not, move the pegs back until the two distances across are the same.



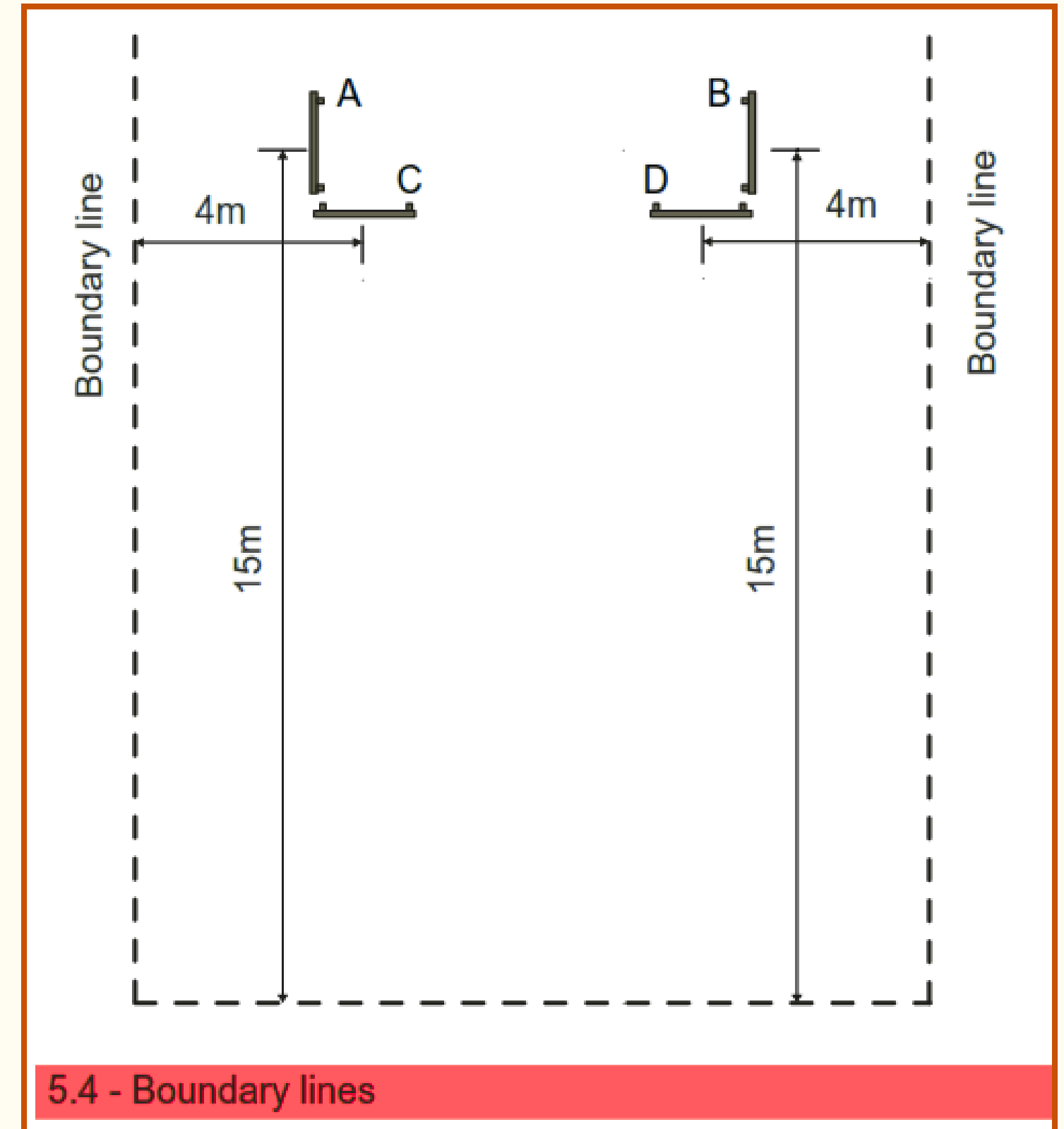
5.3 - This picture illustrates the four corner pegs established and with the profiles in position.



SETTING OUT

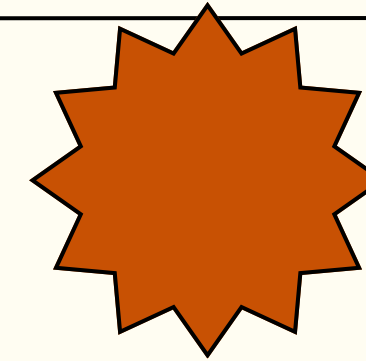


Keep the profiles about one metre away from the temporary located outside corner pegs. This will allow enough room for people and wheelbarrows to pass between the edge of the trenches and the profile, which must remain in position until after the foundation walling has been set out on top of the concrete footings.



5.4 - Boundary lines

SETTING OUT



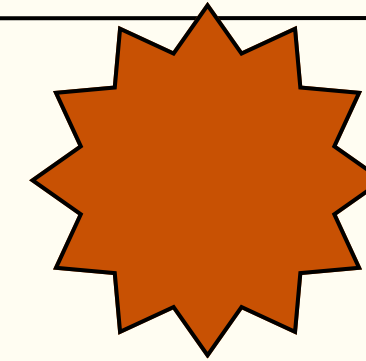
When setting out, there should be one fixed line which must not be moved and from which the rest of the measurements are taken.

Let us assume that the building has to be set back 15m from the street and 4m from the boundary on both sides. Take a tape and measure 15m from the edge of the street or pavement to profile A. Make a pencil mark on the profile. Measure 15m from the street to profile B and make a pencil mark. Small nails may be knocked in on the marks.

Measure 4m from the side boundaries to profiles C and D as shown. Make clear pencil marks. Knock in small nails on the four pencil marks. Tie the end of a ball of line to the nail in profile A. Pull the line taut and tie it to the nail in profile B. This line between profiles A and B represents the fixed line from which the rest of the building will be set out. All the other lines may be moved after this to get the building square, but the line between profiles A and B must remain fixed.



SETTING OUT



Bring the line round and tie it to the nail in profile C, and then let a second person hold it taut across profile E.

The next step is to check whether the angle made by the two lines is a right angle. Use the 3.4.5. Method as follows:

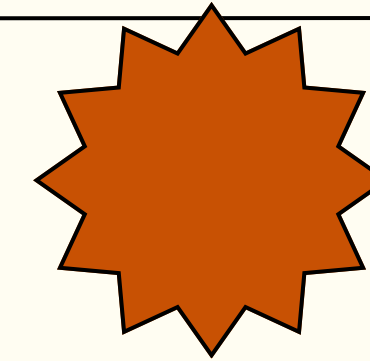
Measure 3m from intersection 1 towards profile E. Mark this point by tying a short piece of string on the line.

Next, measure 4m along the fixed line, again from intersection 1. Mark this point with a short piece of string tied to the line. (see Fig. 5.5)

Take a tape and pull it out until you find the 5m mark. Let another person hold the end of the tape on the 4m mark while you hold the 5m mark over the 3m mark on the line.

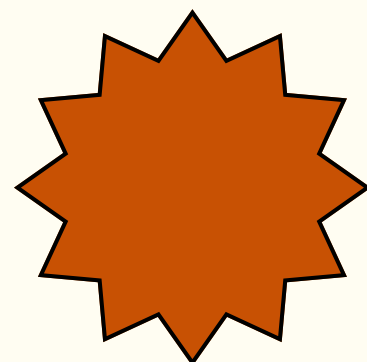
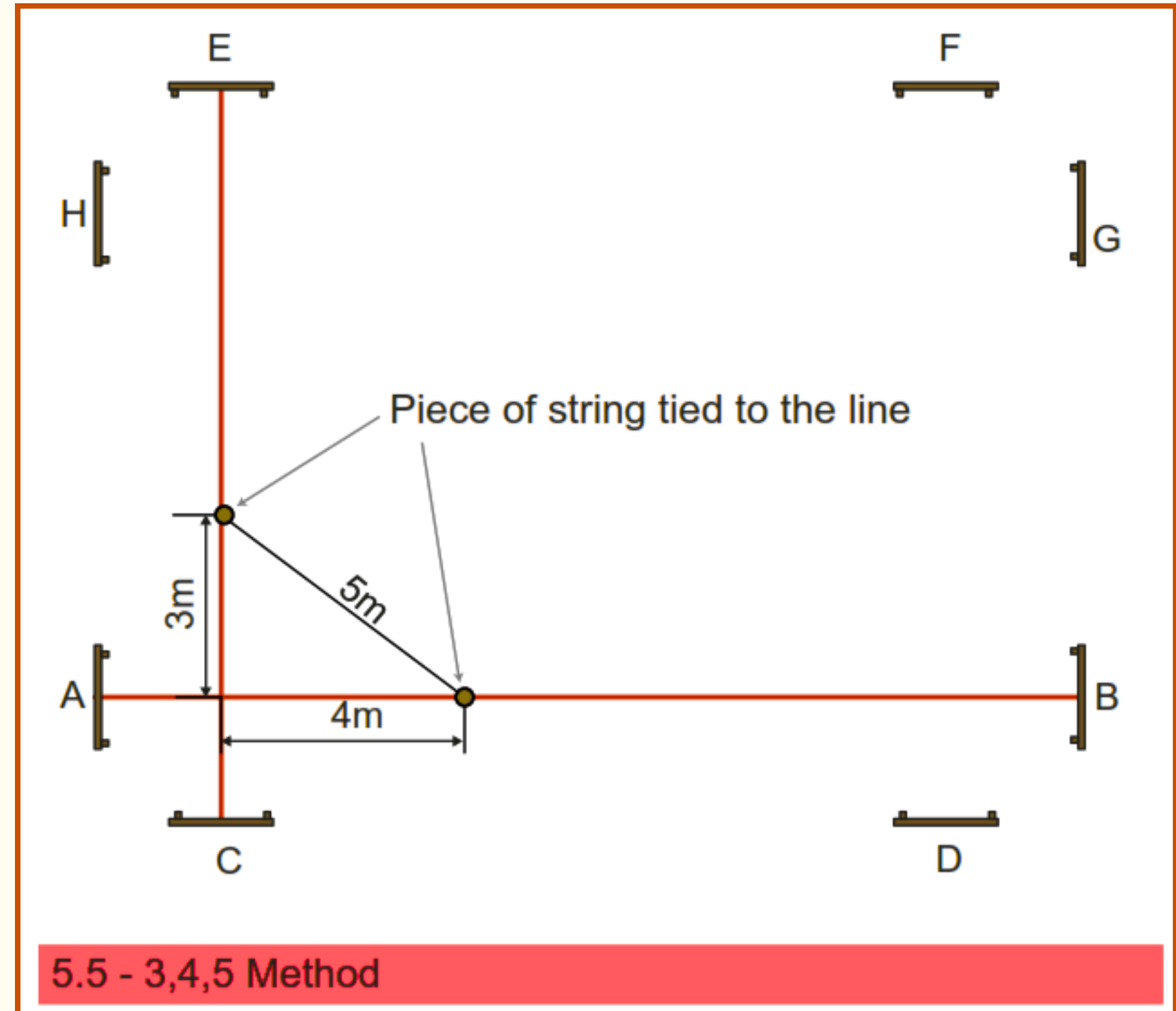
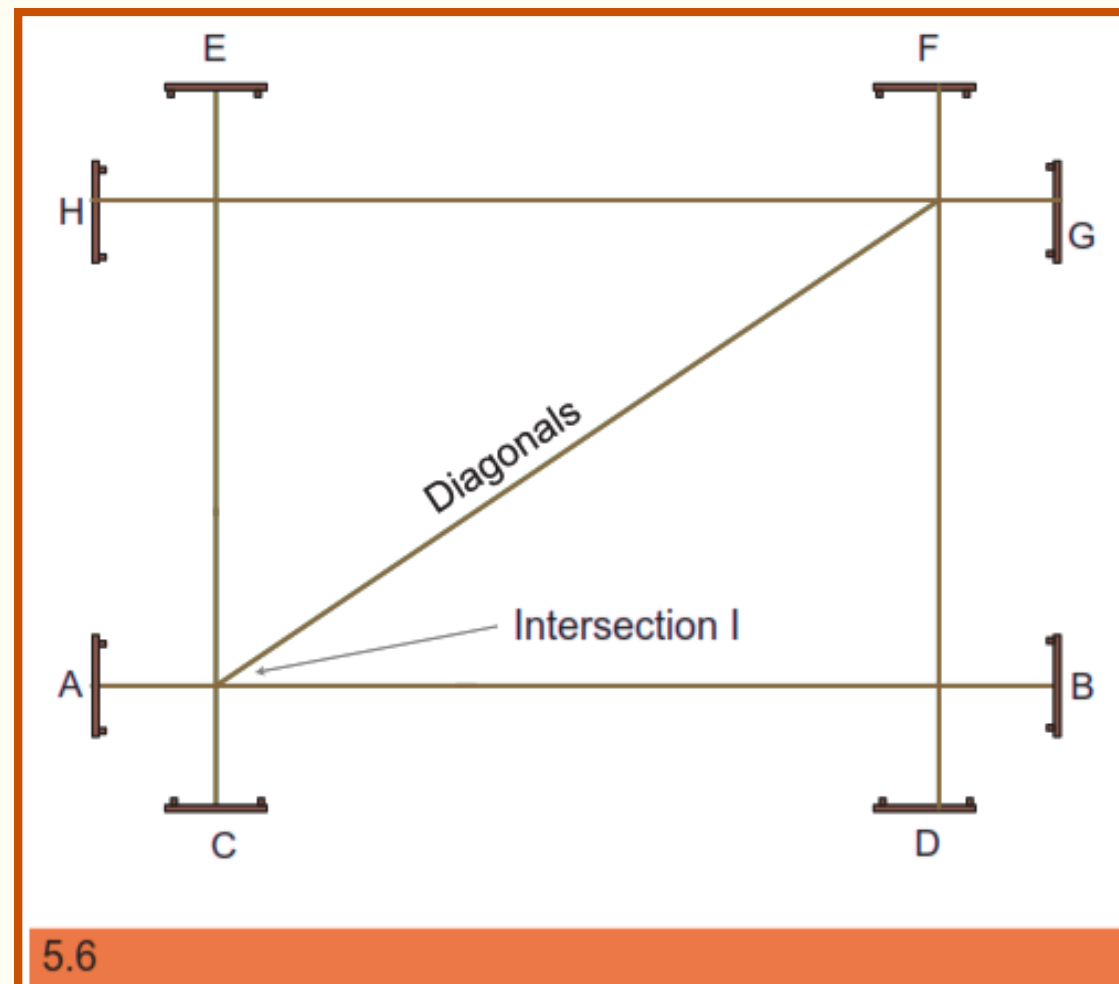


SETTING OUT

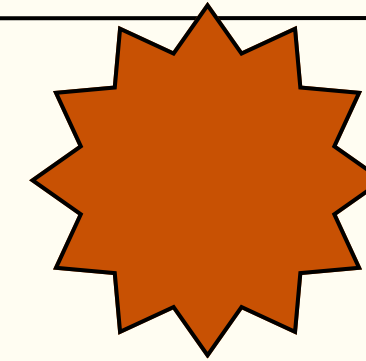


If the 5m mark on the tape is not directly above the 3m mark, the line stretched across profile E must be moved either to the left or to the right by the person holding it, until these two marks are over each other.

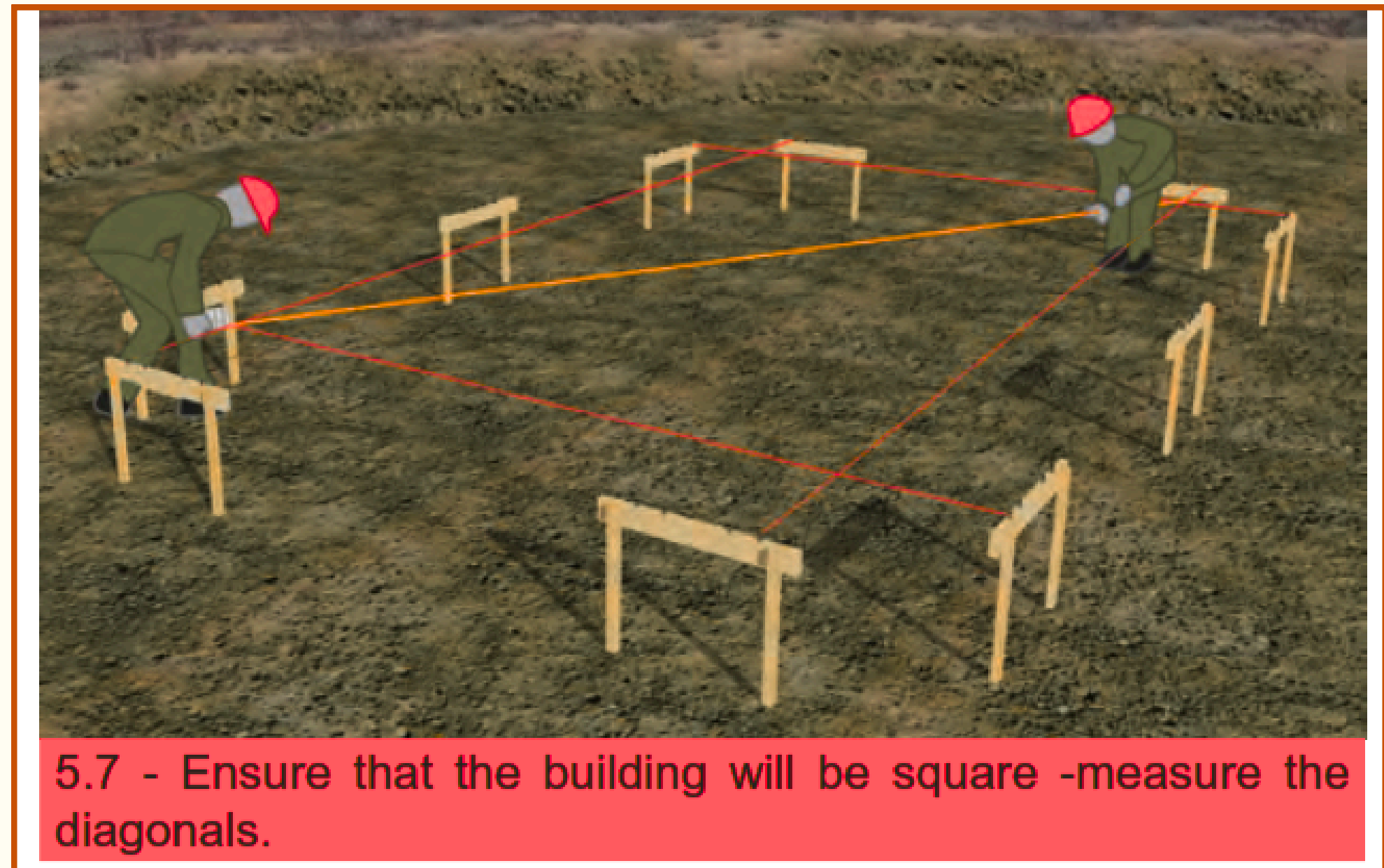
When the 5m mark is directly above the 3m mark, the angle formed by the two lines is a perfect right angle. Knock in a nail next to the line in profile E and tie the line to the nail.



SETTING OUT

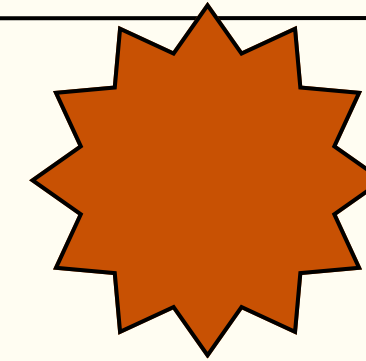


- From the nail on profile B, measure the required length of the side of the building to profile G. Put in the nail.
- Bring the line across from profile H to the nail on profile G. Unroll the line and stretch it taut across profile H.
- Let somebody hold the line taut while two other people use the 3.4.5. Method to check and make sure that the angle between the lines is a right angle. Put in a nail next to the line on profile G and tie the line to it.
- Three sides of the building have now been set out.
- From the nail on profile C, measure the length of the building to profile D. Do the same from profile E to F. Put in a nail on profile F.
- Bring the line around from profile G to the nail on profile F. Unroll it, and pull it taut while tying it to the nail on profile D.
- The four sides of the building have now been set out. The four lines will appear as shown in figure 5.6.



5.7 - Ensure that the building will be square -measure the diagonals.

SETTING OUT



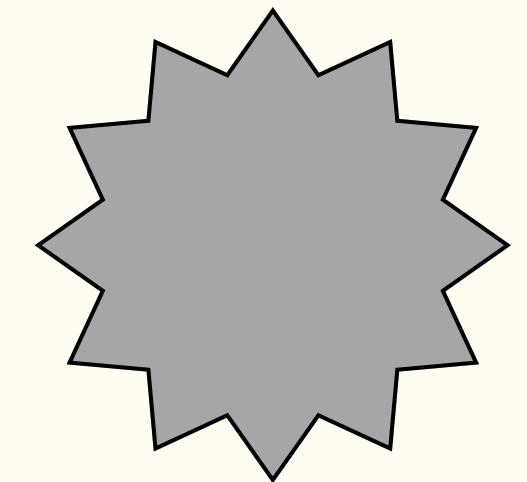
The lines represent the four sides of the building.

Although, we have checked each corner by means of the 3.4.5 Method, the building may still not be perfectly square. To make quite sure, we must measure diagonally across from corner to corner, as follows:

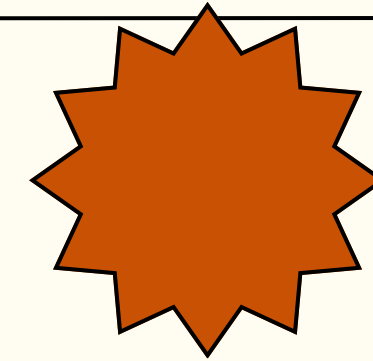
Let somebody hold the end of the tape above the point where the lines cross at profiles A and C.

Pull the tape taut towards profiles F and G. Read off the figures appearing on the tape at this point, or hold your finger on the mark. Let the person holding the tape walk over to profiles E and H while you walk to profiles D and B.

Check the distance, as shown. If the two diagonals are the same, the lines are rectangular and the building is square. (See Fig. 5.7).



SETTING OUT

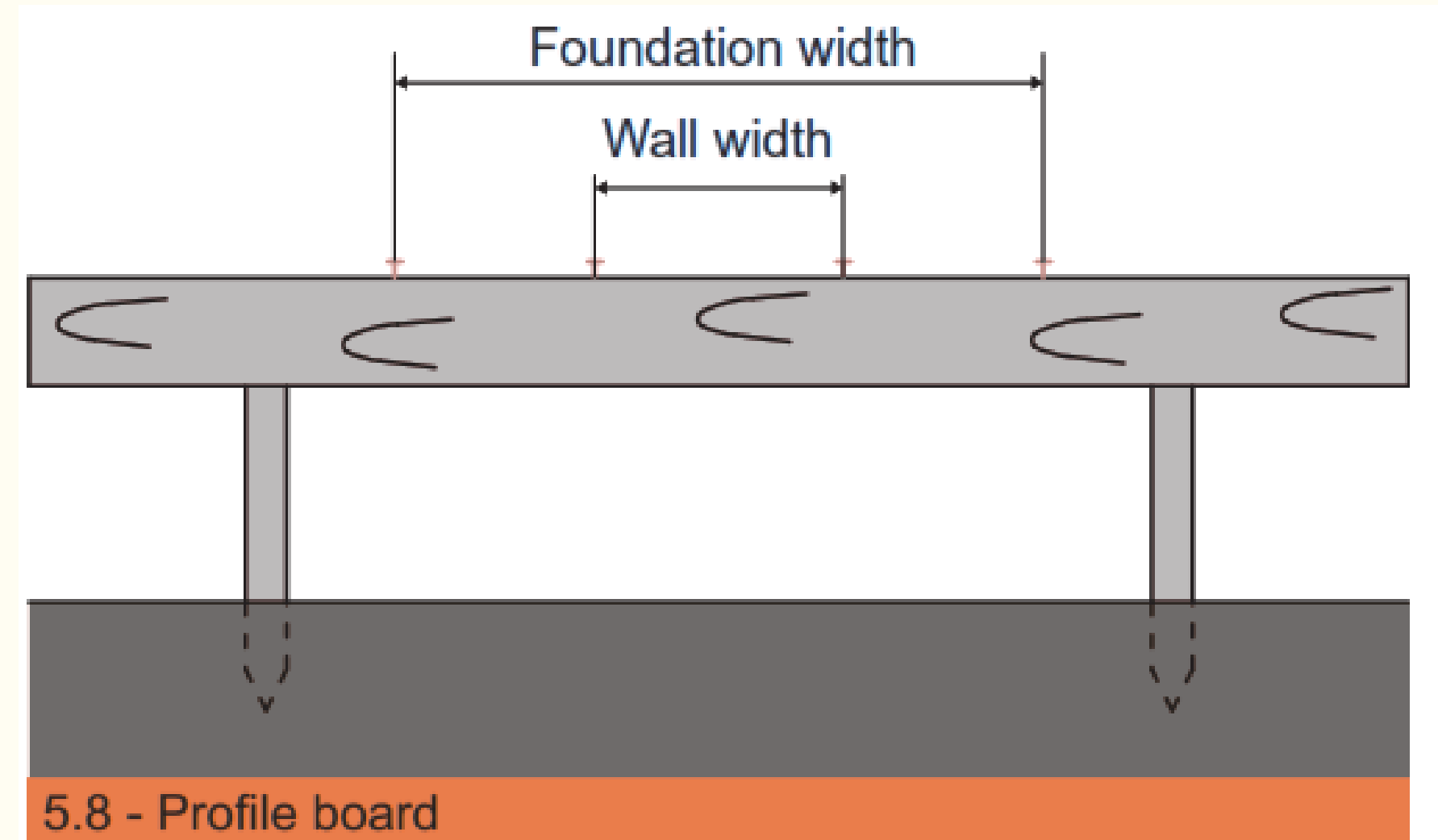


To mark out the width of the foundations on the profile, the thickness of the walls must first be marked off as follows:
On profile A, from the nail, measure with a tape, the thickness of the outside wall and make a pencil mark. This measurement must be in the direction of profile H. In other words, the rectangle formed by a line between these nails, will be the internal line of the external wall of the house.

After putting in the nails representing the inside of the walls, the nails representing the foundation can be driven into the profiles.

Let us suppose the foundations must extend for 15 mm on each side of the wall. Measure, 150mm on each side of the two nails on each profile. Put in the extra nails. These nails represent the width of the foundation. The profile will now appear as shown on the illustration. (Fig. 5.8)

Untie the line on the inside nail and fix it to the outside nails, starting from one side. After completing this step, eight lines should be stretched across the site, representing the internal and external lines of the foundations.

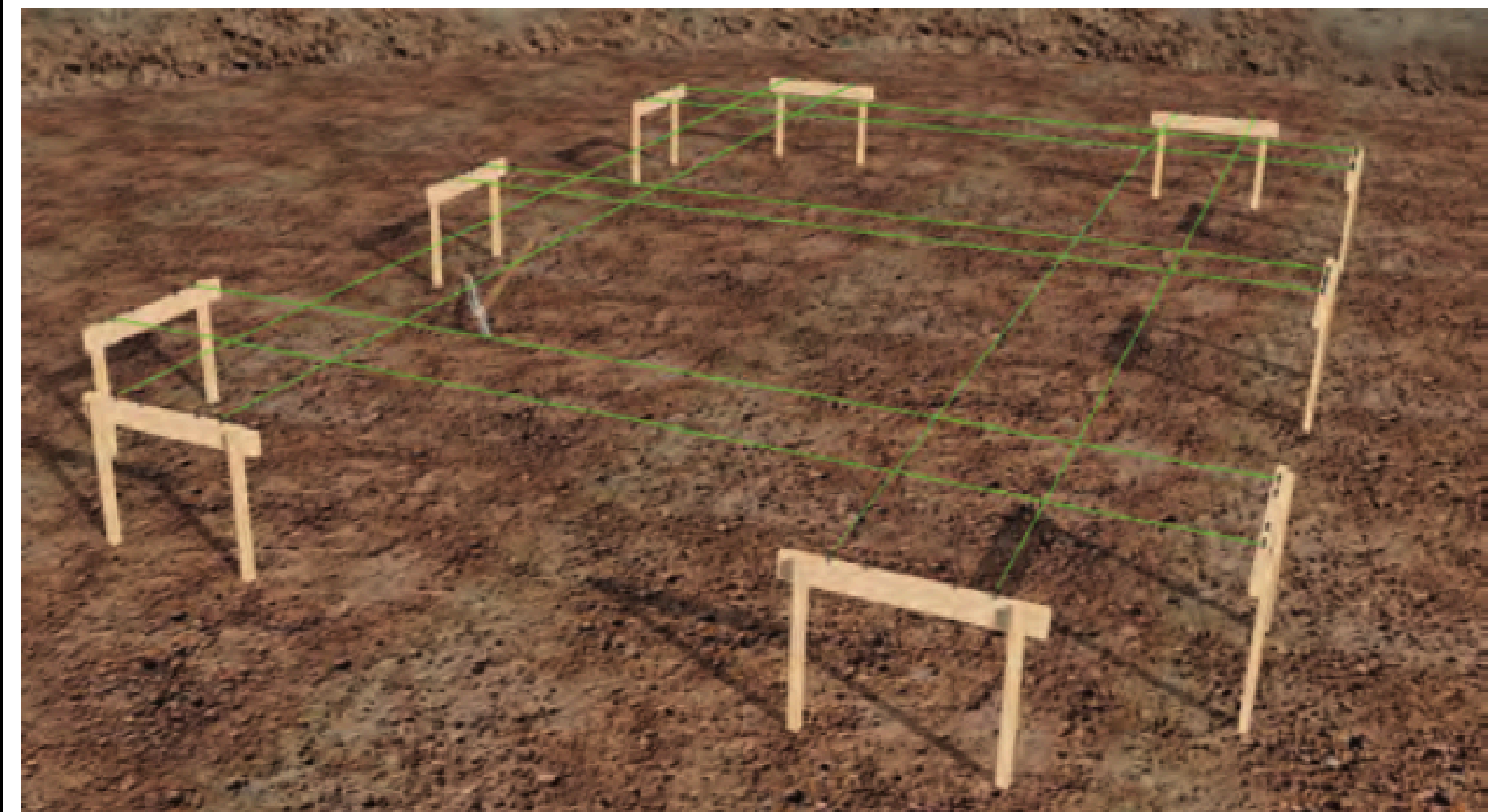


Study pictures 3 to 5, following the description, and you will see what the building site looks like with the lines strung across to represent the foundations. Transfer these lines onto the round by using a pick or other sharp object, as shown in the pictures.

5.7 - Ensure that the building will be square -measure the diagonals.

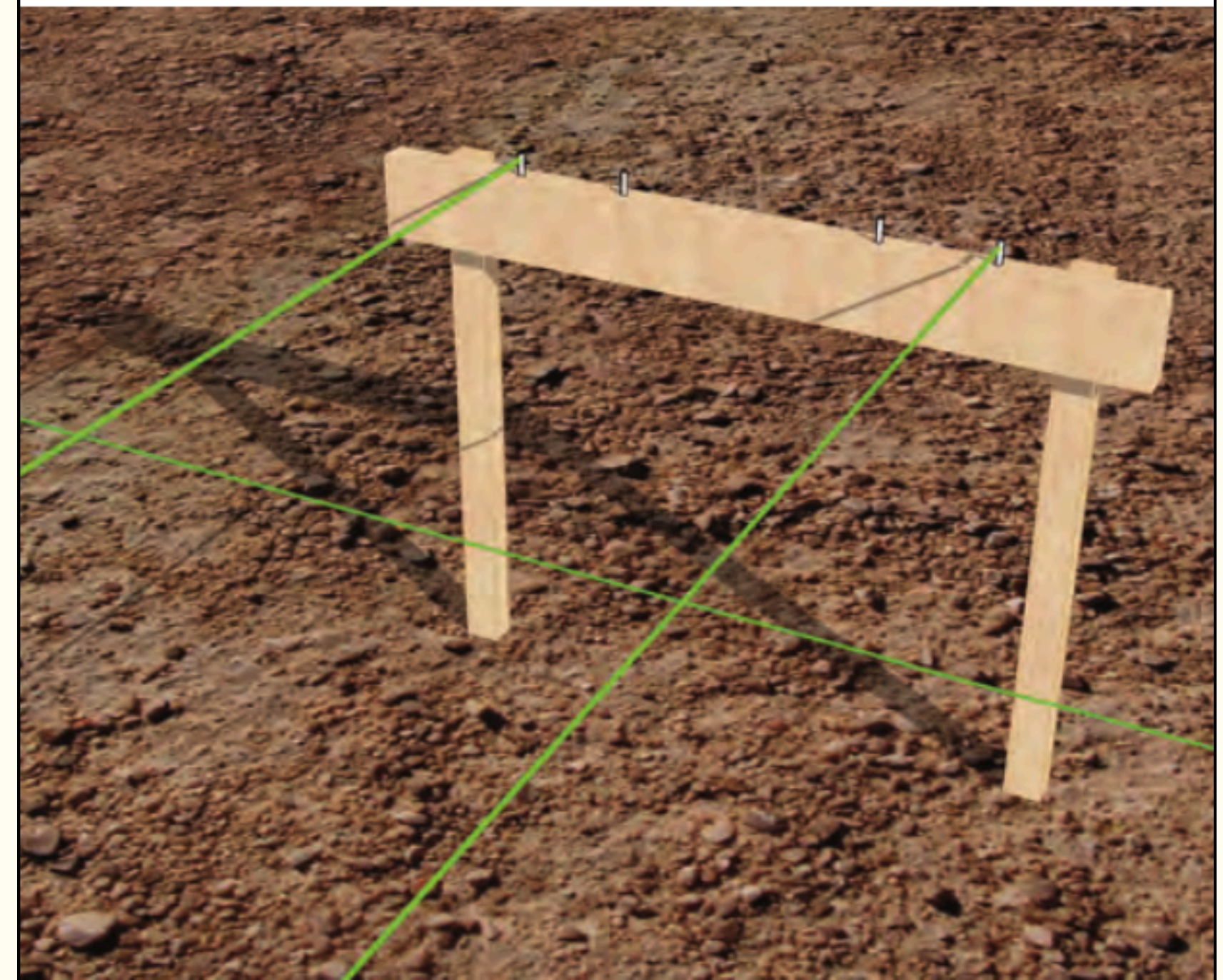
Start digging the trenches.

SETTING OUT



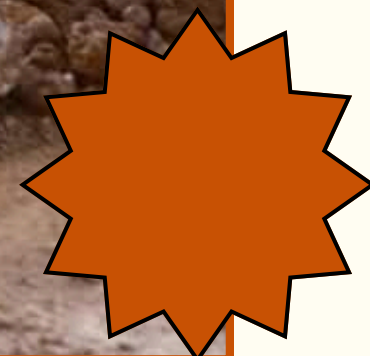
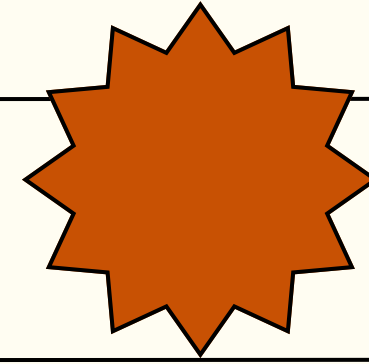
5.9 - The first step in setting out the foundation is to erect timber profile right round the proposed building using scaffolding planks, bluegum poles or any other similar straight timber. All foundations and wall dimensions are then marked out on these profiles by means of nails driven into the wood. The figure shows the builder's line for marking out the foundations.

SETTING OUT



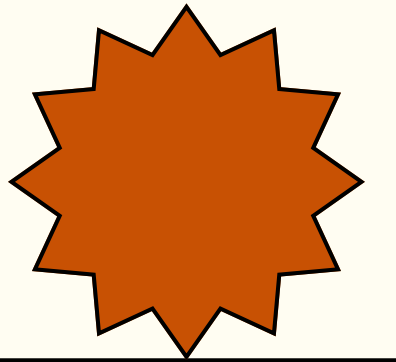
5.10 shows very clearly what a profile looks like. Note how the width of the wall as well as the foundation is marked off. The profiles are also kept well back from the corners.

SETTING OUT



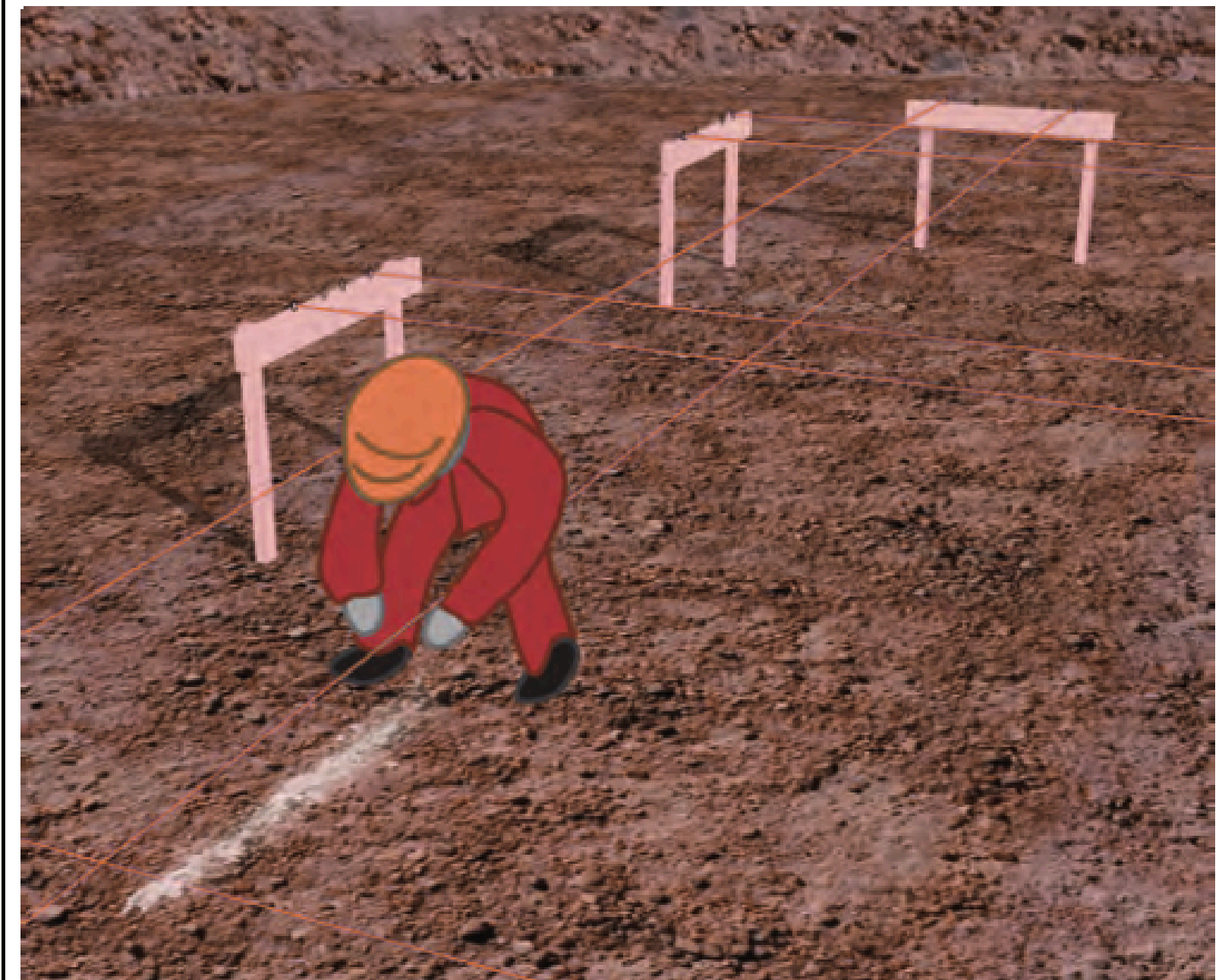
5.11 - The foundation measurements may be transferred to the ground by using a pick as shown

SETTING OUT



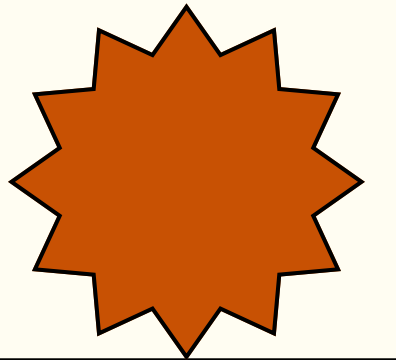
The bottom of the trench should be level and the sides' plumb, as shown in the figures. Where big stones or tree roots have been taken out, the holes in the trench must be filled in with soil that is well rammed before the concrete foundations are laid. When the ground slopes, trench bottoms must be stepped so that the foundation itself does not slope. The steps should be equal to one or more courses of brickwork, as shown in Figure 5.15.

To ensure that the foundation itself will be level and of uniform depth, level pegs must be hammered in along the trenches. The length of peg left to protrude from the ground should be equal to the thickness that the concrete will eventually have. 5.10 shows very clearly what a profile looks like. Note how the width of the wall as well as the foundation is marked off. The profiles are also kept well back from the corners. For the purpose of this example, assume a concrete thickness of 225mm.



5.12 -The foundation measurements can also be transferred down by pouring lime or sand on the ground below foundation

SETTING OUT



Set the first peg in the ground at the lowest point in the foundation trench, allowing it to protrude 225mm above the bottom of the trench. Place one end of a 2 metre straight-edge on the first peg. Drive in another peg near the end of the straight-edge. Check to see whether the two pegs are level by placing a level on top of the straight-edge. Hammer in the second peg until the two pegs are dead level. (Refer to Figure 5.12.)

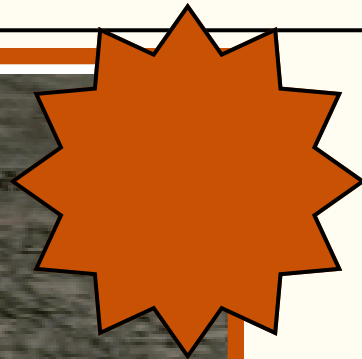
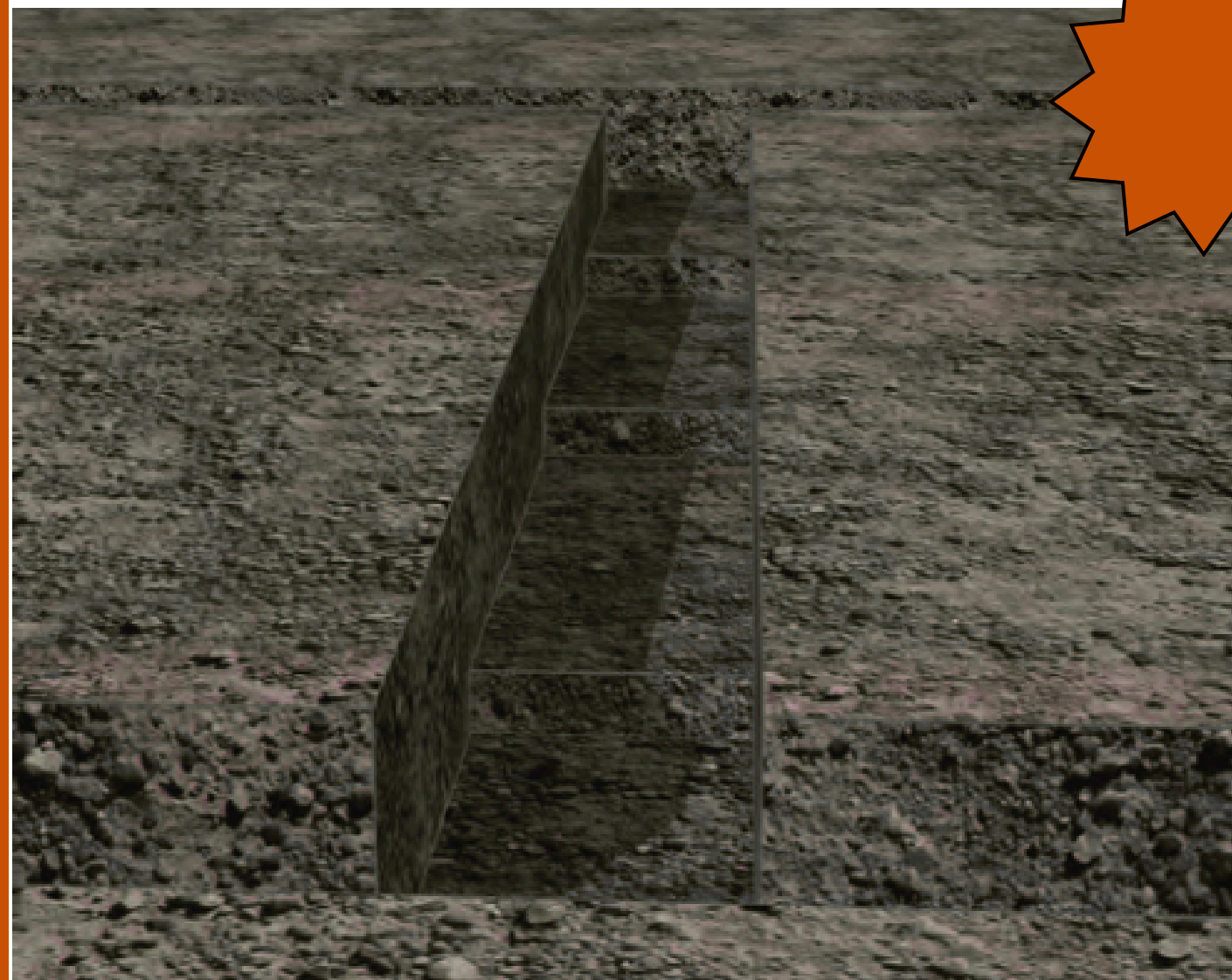
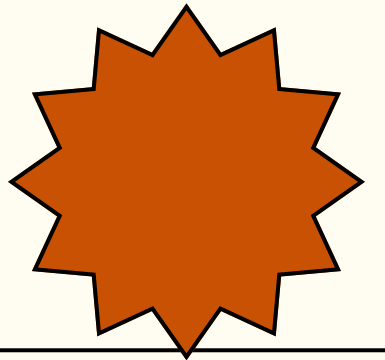


NOTE

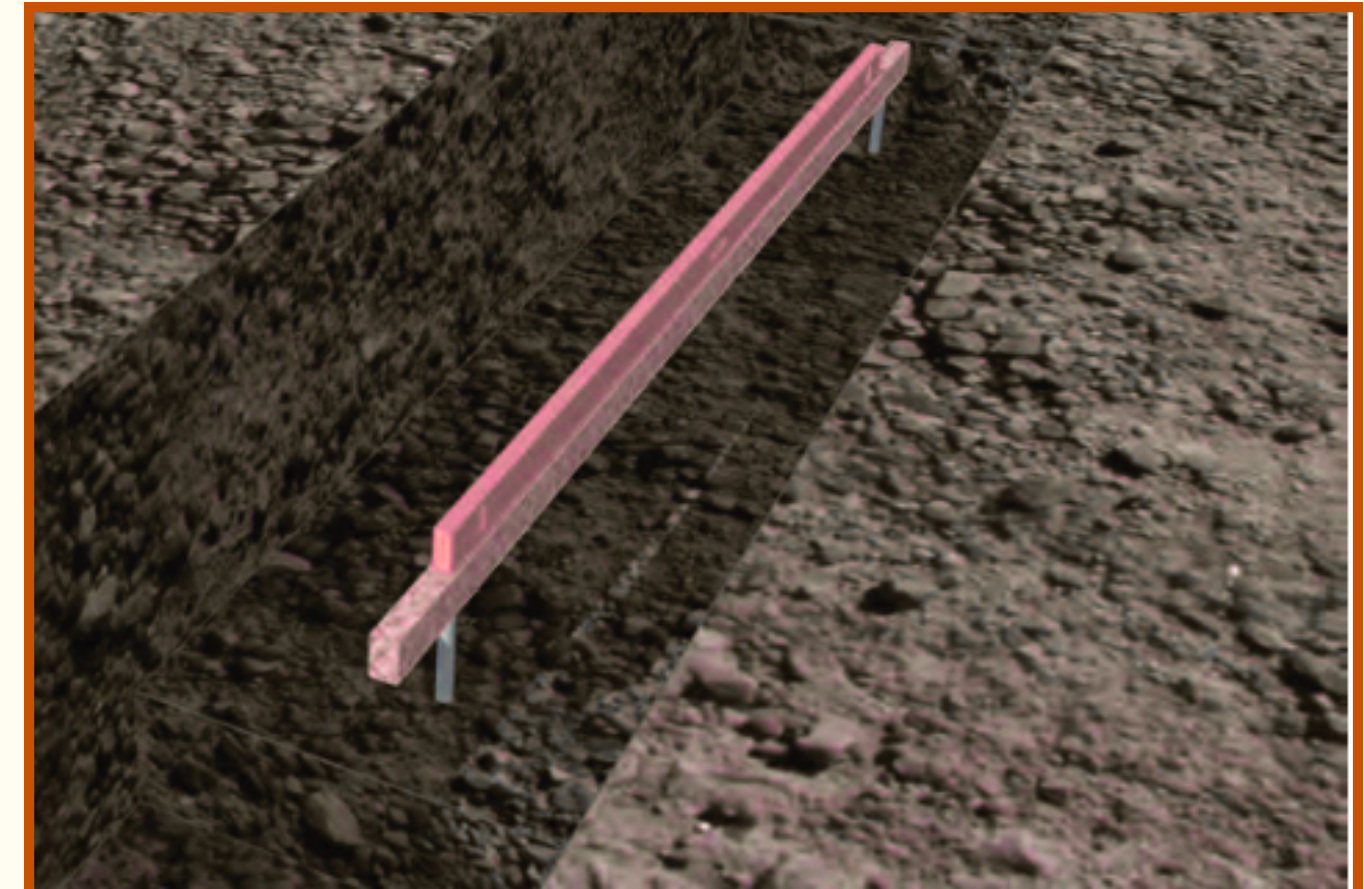
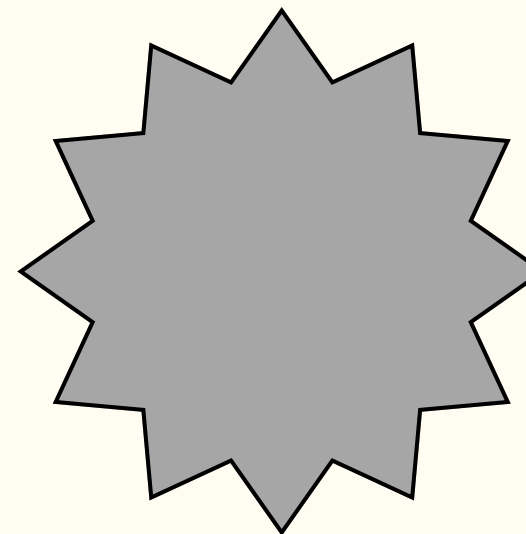
Foundation trenches can be 'shored' in wetter conditions to prevent the trenches from collapsing. Timber boards are placed against the edges and braced in place using a wooden plank.



SETTING OUT

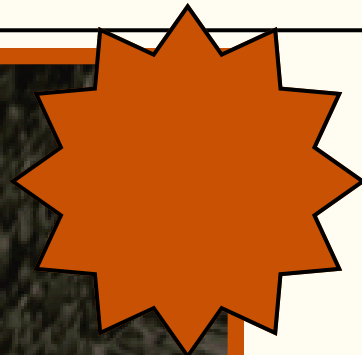
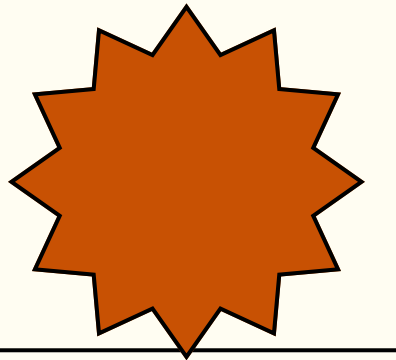


5.13 - Foundation trenches should be dug to a depth of not less than 400mm below the surface all round, following the contours of the ground. The width of the trench is usually twice the thickness of the wall plus 150mm, with a minimum width of 450mm for internal walls. The figure shows how the sides of the trench must be trimmed neatly and square.



5.14 - Level pegs are then driven into the bottom of the trench starting at the lowest point and allowing the first peg to protrude 225 mm above the bottom of the trench. Use a 2 m straight-edge and drive in the next peg slightly less than the length of the straight-edge away from the first peg. The top of the second peg is levelled with the top of the first, using the straight-edge and spirit level. This process is continued along the trench until the last peg to be driven in level protrudes less than 150 mm above the bottom of the trench. At this point another peg is driven in next to the last peg, but with its top about 90 mm higher. At this point the foundation will later be stepped.

SETTING OUT



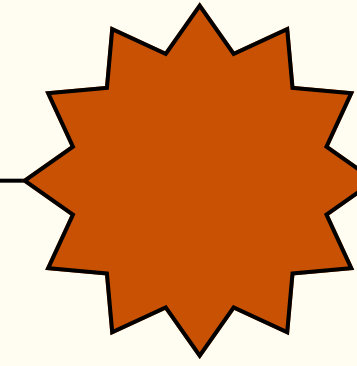
IMPORTANT NOTE:

Steps in foundation should be equal to marks on the gauge rod (courses). Remember that the distance between the marks on the gauge rod is equal to the thickness of a brick plus a mortar joint.

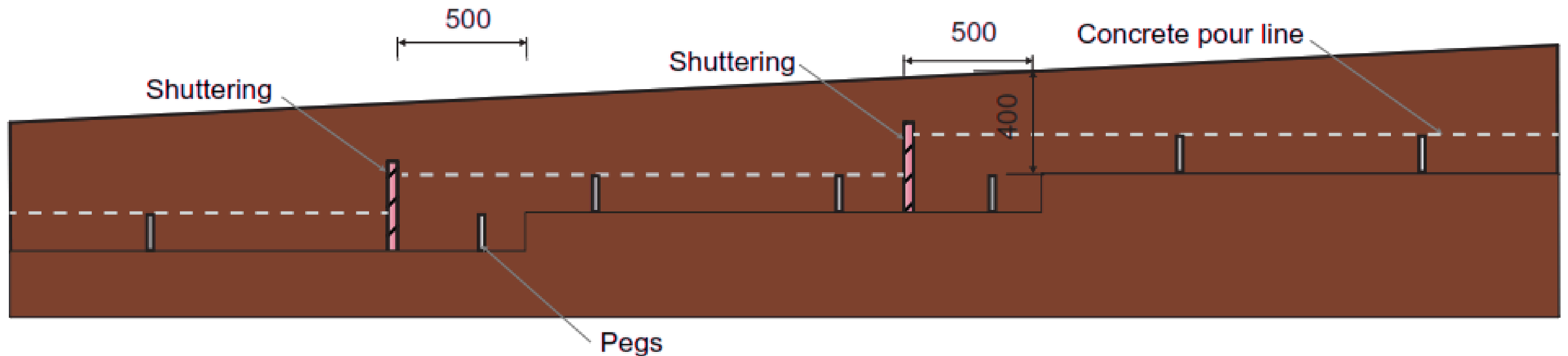


5.15 –Figure showing gauge rod in relation to peg height

16 Level pegs in position.

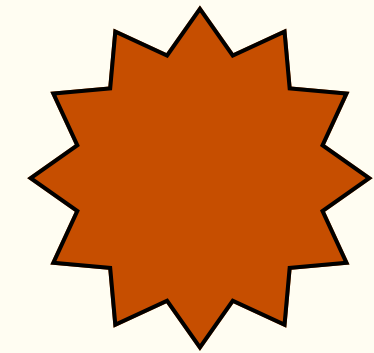


SETTING OUT



5.17 - Section through stepped foundation

SETTING OUT

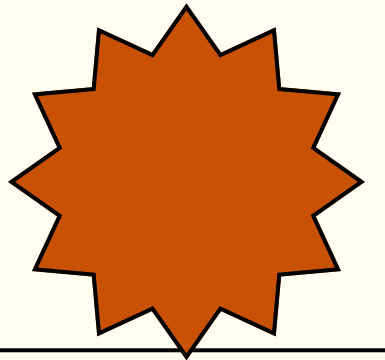


Carry on inserting the pegs level along the trench bottom until you reach a stage where the peg no longer protrudes more than 150mm above the ground. A step must now be made in the trench. Finish putting in all the pegs on a level before starting on the next level.

Assuming that the second level is two courses above the first, start this level by putting in a peg next to the last peg on the previous level, as shown in the figures.

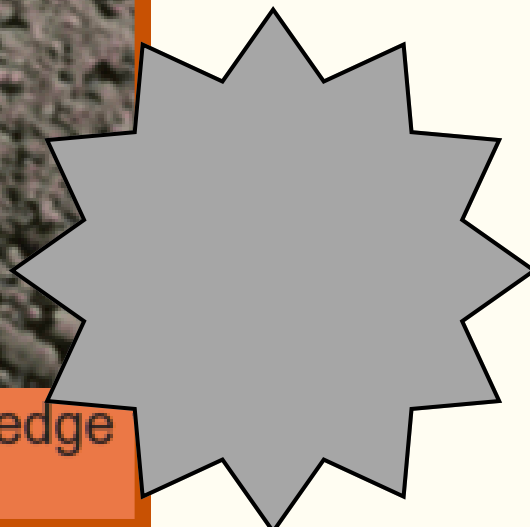
The top of the new peg should be two courses higher than the top of the adjacent peg on the previous level. When all the pegs have been set out on the different levels, start on one side and remove all surplus sill so that all the pegs protrude 225mm. This will ensure that you have a 225mm thick concrete foundation all round.

SETTING OUT



IMPORTANT NOTE:

Steps in foundation should be equal to marks on the gauge rod (courses). Remember that the distance between the marks on the gauge rod is equal to the thickness of a brick plus a mortar joint.



18 - Level the foundation concrete using a straight-edge e top of the concrete thickness pegs.



5.19 - Showing completed foundations with steps.