

Introduction to Centerline Calculation

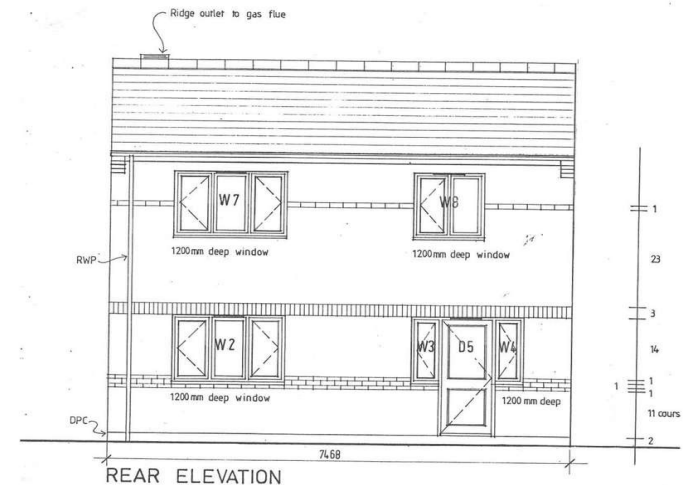
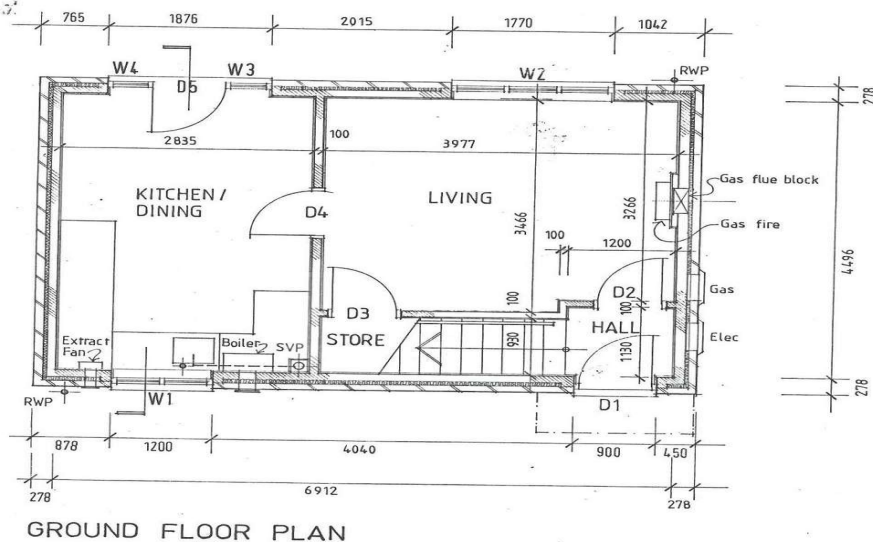
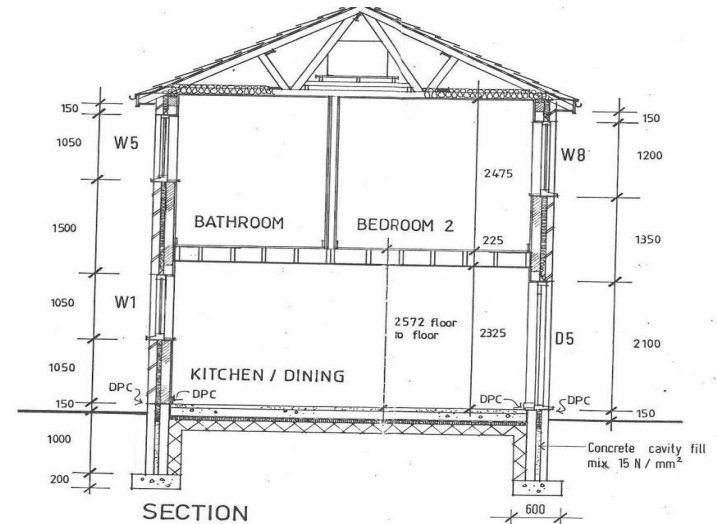
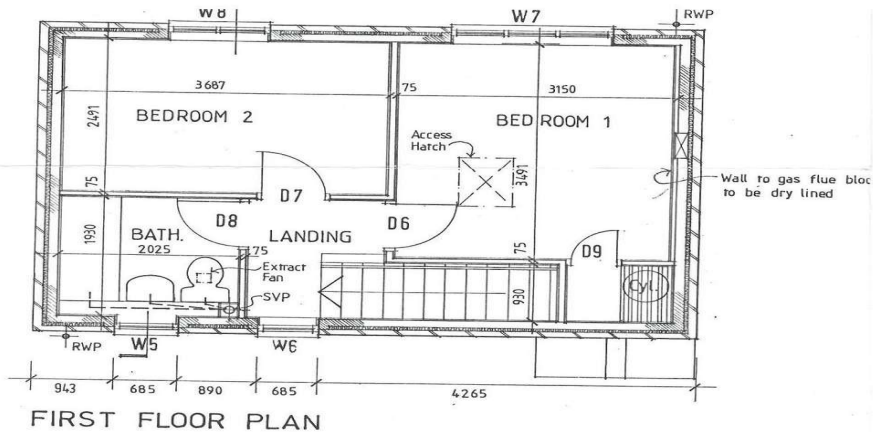
A brief introduction to the processes involved in the measurement of a substructure brick external wall of a domestic dwelling.

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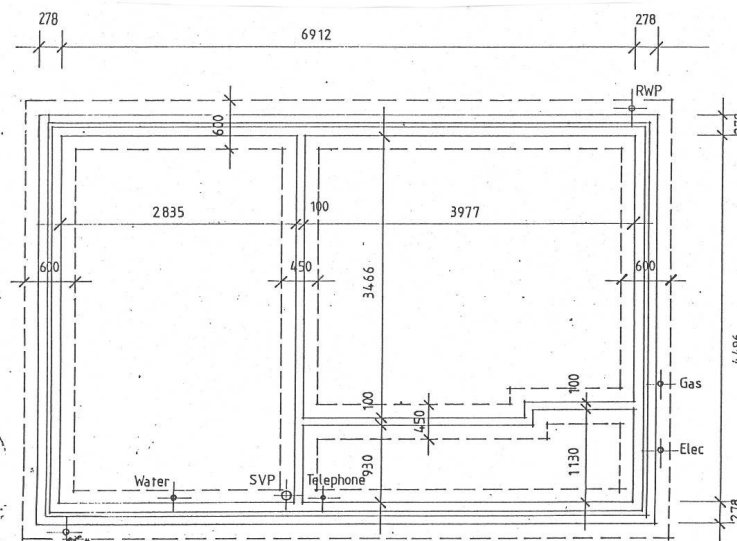
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Trinity Saint David



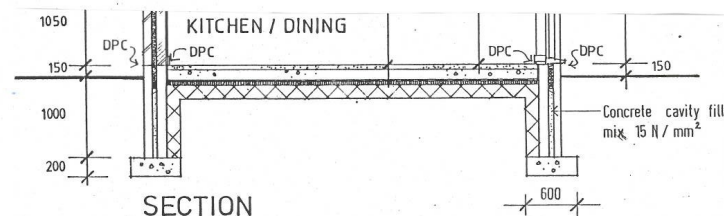


Step 1: Identify the Specification and relevant parts of the drawing.

- For the brickwork, the most accurate dimensions and descriptions are given on the foundation plan and the section. Here we have the relevant parts taken from the plan, and put together to focus our attention.



FOUNDATION PLAN

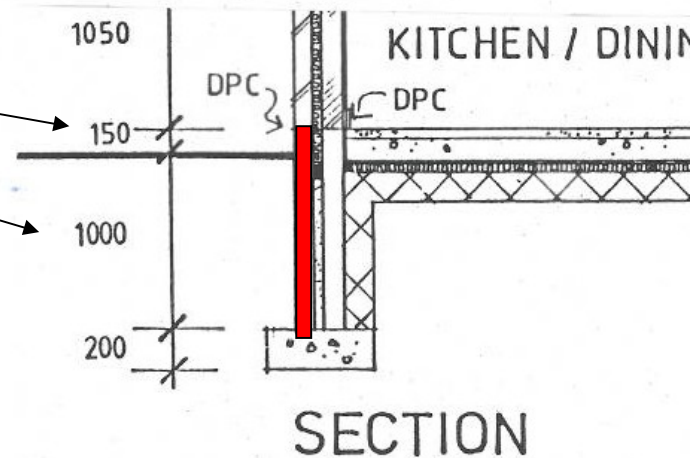


SECTION

Step 2: Identify the relevant dimensions on the drawing.

- For the brickwork we require an area in M2, therefore dimensions that we require are the **length** and the **height**. These will then allow us to calculate the area of brickwork.
- In most examples the height is shown on the drawing section, so only a simple calculation to undertake.
- Height in this example would be:
 - $1000\text{mm} + 150\text{mm} = 1150\text{mm}$

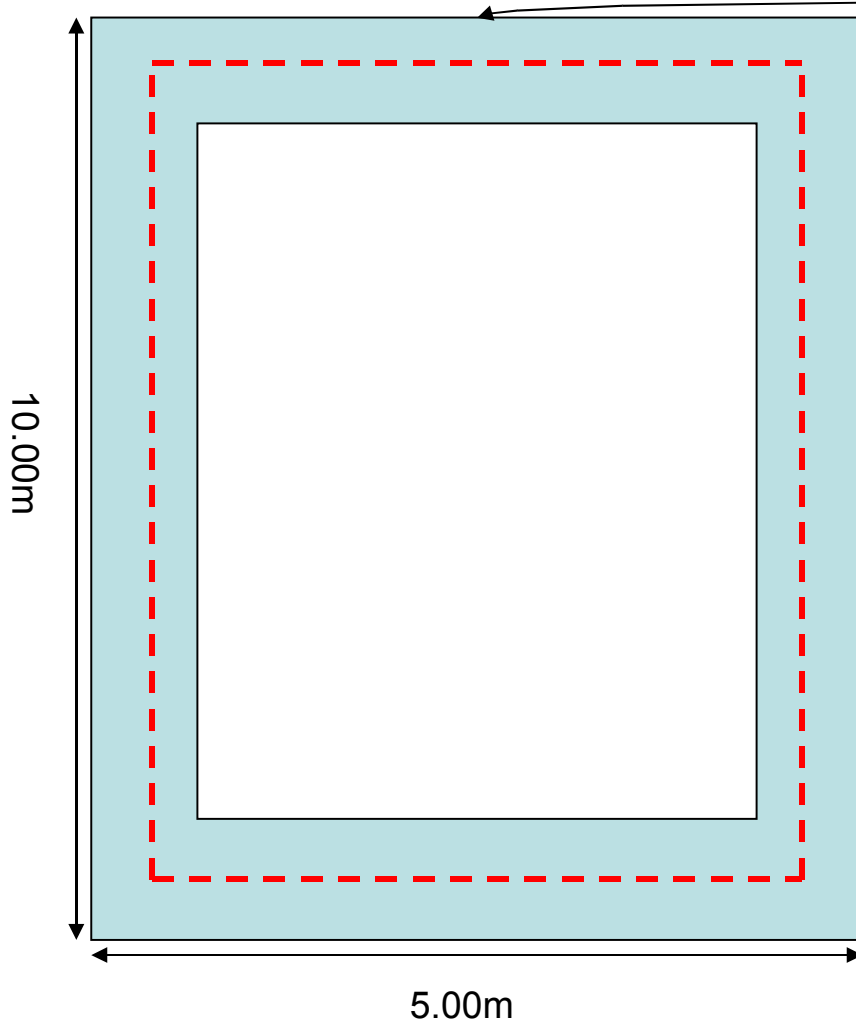
- This gives us the height from foundation to DPC, which is the extent of the Substructure works.



Step 3: Calculate the Length.

- The length of the brickwork must be the **centreline** length of the wall, and not the external perimeter of the wall. If we were to use the external perimeter we would have over-measured the quantities.
- In order to accurately calculate the centreline length of the wall, we start with the external perimeter, and then make adjustments to the corners of the wall.
- The following slides detail this process.

Step 3: Centreline Calculation



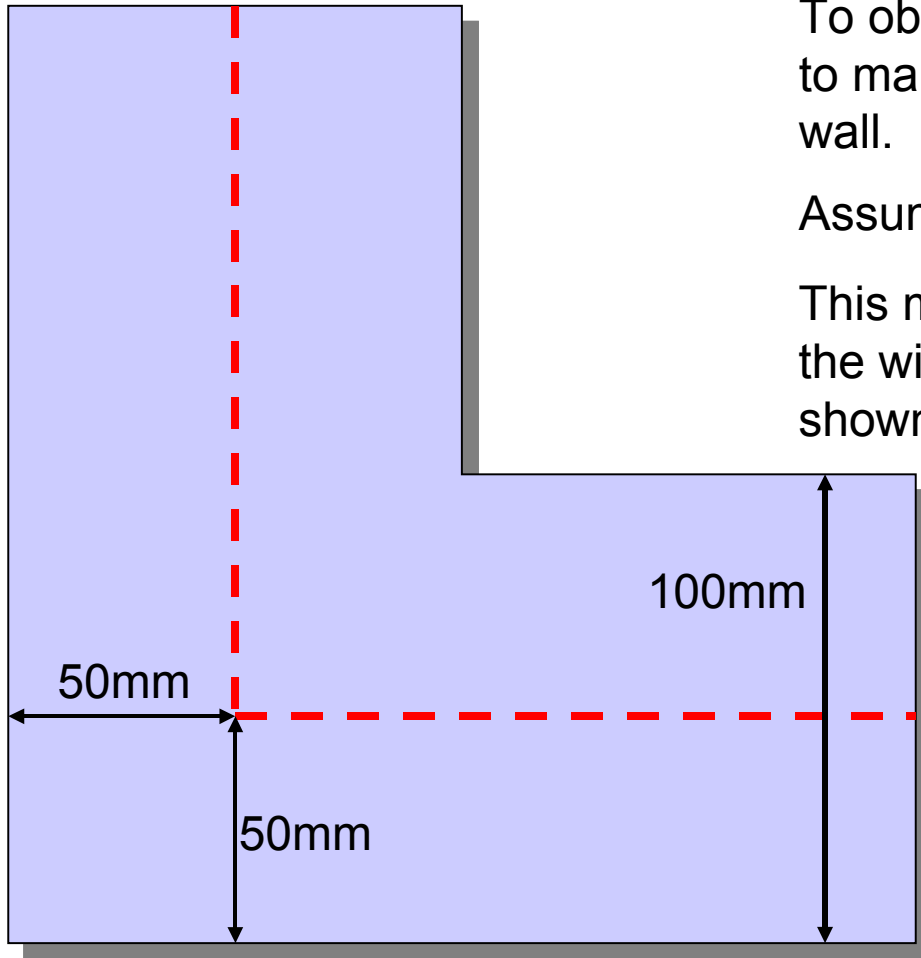
The external perimeter of the wall as shown opposite calculates to be 30m. $((2 \times 10) + (2 \times 5)) = 30$

Using this information, we can calculate the centreline of the wall.

The Centreline is shown in red opposite.

This line gives the actual length of brickwork used for this wall.

Step 3: Centreline Calculation

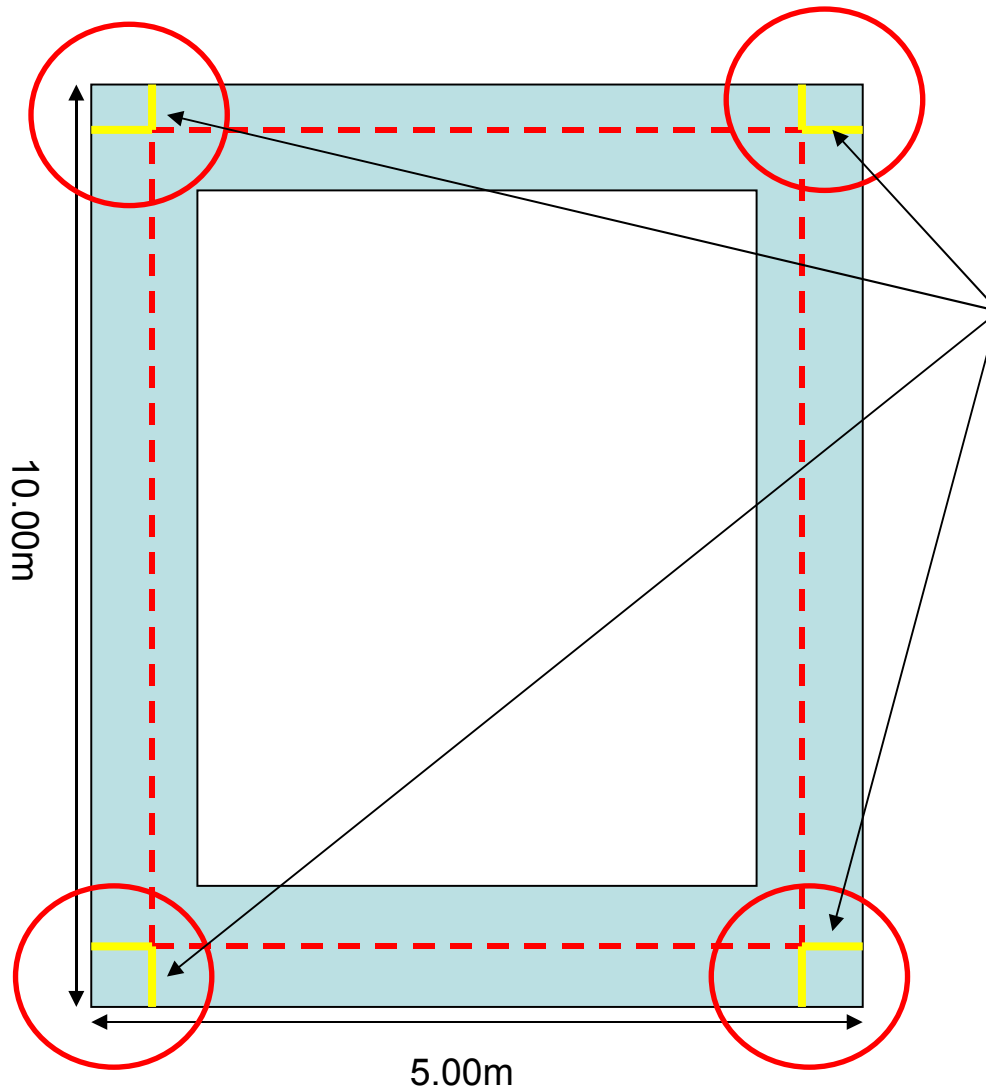


To obtain the centreline length, we need to make adjustments to the corners of the wall.

Assume the wall is 100mm wide.

This means we need to DEDUCT half the width, 50mm, off each corner as shown.

Step 3: Centreline Calculation



Adjustments to the corners happens at each individual corner.

Therefore we need to DEDUCT 50mm twice at each of the 4 corners.

We started with 30m, and we need to DEDUCT:

$$4 \times (2 \times 50\text{mm}) = 400\text{mm or } 0.40\text{m}.$$

$$\text{This gives us: } 30.00 - 0.40 = 29.60\text{m}.$$

Therefore the centreline length of this wall is 29.60m

Step 3: Centreline Calculation

The formula for the centreline can be further simplified as the following:

$$\text{Centreline} = \text{External Perimeter} - (4 \times 2 \times (0.5 \times \text{Original Width}))$$

In other words, deduct half the wall width twice for each corner. This is because you are decreasing the perimeter from the outside to the middle.

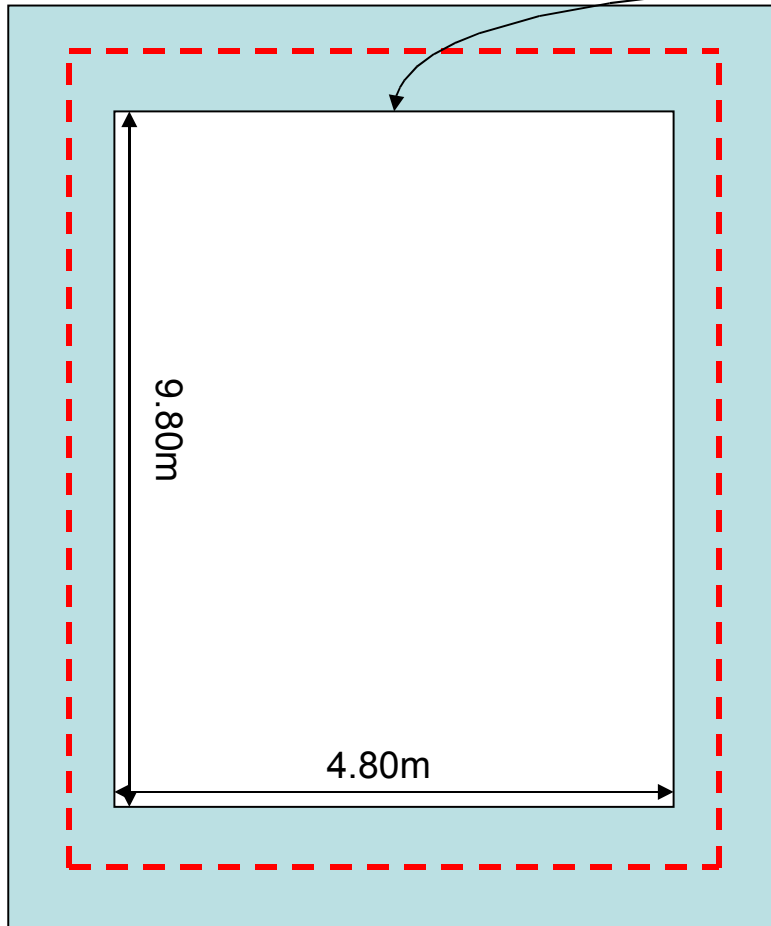
Alternative Centreline Calculation

So far, we have seen that you can calculate the centreline length by starting with the [external](#) perimeter.

Using the same methodology, we can also work out the centreline length by starting with the [internal](#) perimeter.

The following slides detail how that is achieved.

Alternative Step 3: Centreline Calculation



The internal perimeter of the wall as shown opposite calculates to be 29.20m.

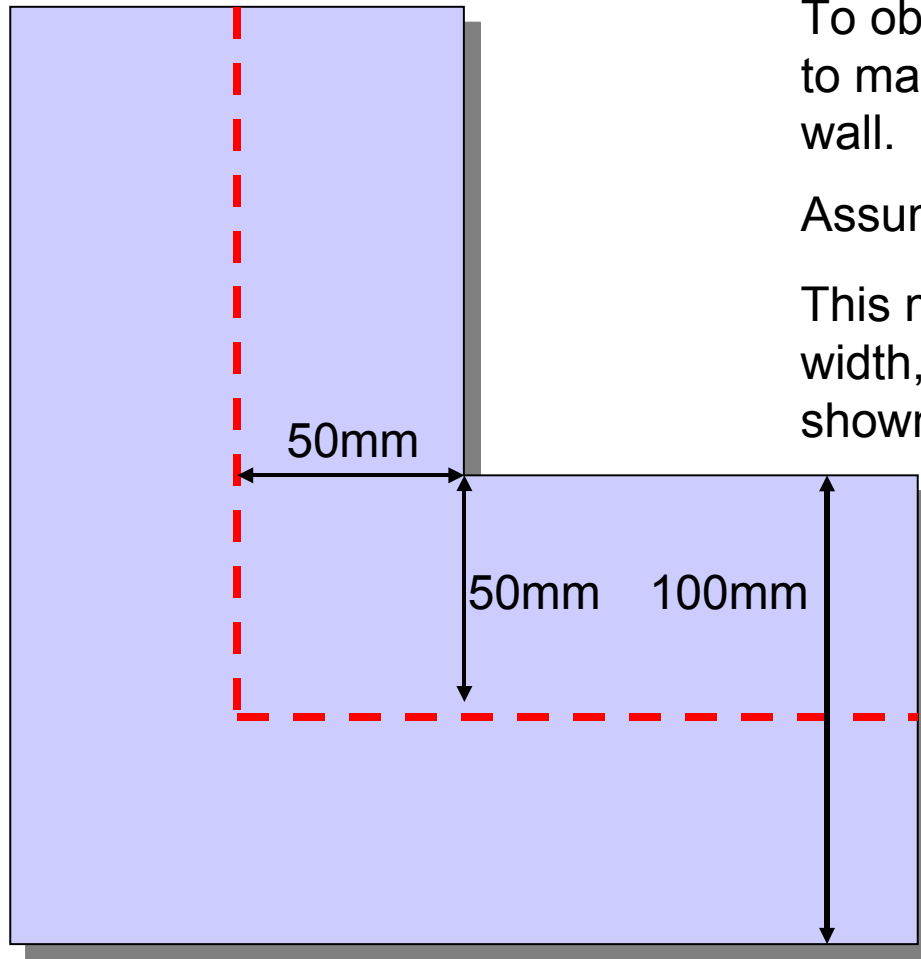
$$((2 \times 9.80) + (2 \times 4.80)) = 29.20\text{m}$$

Using this information, we can calculate the centreline of the wall.

The Centreline is shown in red opposite.

This line gives the actual length of brickwork used for this wall.

Alternative Step 3: Centreline Calculation

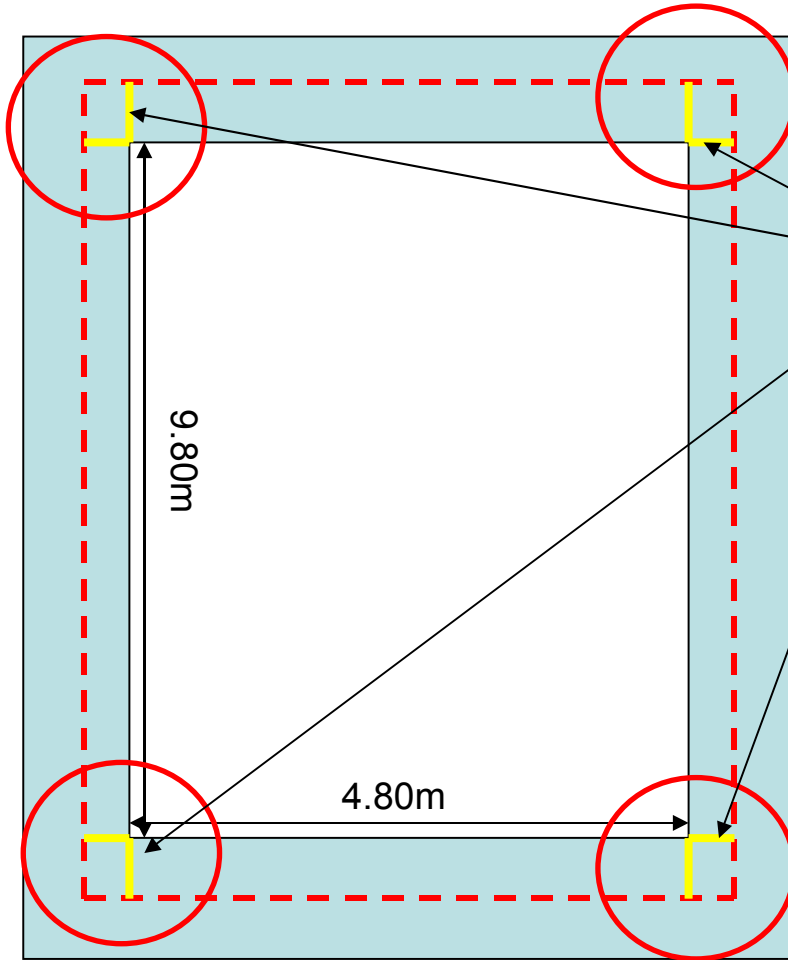


To obtain the centreline length, we need to make adjustments to the corners of the wall.

Assume the wall is 100mm wide.

This means we need to ADD half the width, 50mm, to each corner as shown.

Alternative Step 3: Centreline Calculation



Adjustments to the corners happens at each individual corner.

Therefore we need to ADD 50mm twice at each of the 4 corners.

We started with 29.20m, and we need to ADD:

$$4 \times (2 \times 50\text{mm}) = 400\text{mm or } 0.40\text{m}.$$

This gives us: $29.20 + 0.40 = 29.60\text{m}.$

Therefore the centreline length of this wall is 29.60m

Alternative Step 3: Centreline Calculation

As you can see, this gives us the same figure as before, which confirms that the calculation is correct.

The formula for the centreline can be further simplified as the following:

Centreline = Internal Perimeter + (4 x 2 x (0.5 x Original Width))

In other words, ADD half the wall width twice for each corner. This is because you are increasing the perimeter from the inside to the middle.

Step 4: Calculate the Area.

- Now we are in possession of all the relevant dimensions, we can calculate the area.
- Using the examples we have the following dimensions:
 - Length = 29.60m
 - Height = 1.15m
- Therefore the area of the external skin of substructure brickwork is $29.60 \times 1.15 = 34.04\text{m}^2$
- We can now combine this area with a detailed description of the item of work to allow accurate pricing of this item.

Step 5: Write the description and completion.

- Now we are in possession of all the relevant information, we can write the description and complete this item.
- Using the Standard Method of Measurement (SMM7) and the associated specification document, which was covered previously, we arrive at the following:

Common Brickwork to
BS3921; in Stretcher
Bond, with cement mortar
(1:3)

Walls;

100mm thick;

Vertical

quant	unit	rate	£	p
34.04	m2			