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STAIRS DESIGN

WMF PHASE 6



2 STAIRS

- There are several things to look out for when measuring up on site before deciding on stair design and layout.
- These include:
 - Stair well dimensions
 - Overall Rise (Finished floor to finished floor)
 - Overall Going available
 - Minimum landings required
 - Possible obstructions (eg. Doors, bulkheads)
- [Technical Guidance Documents: TGD](#)

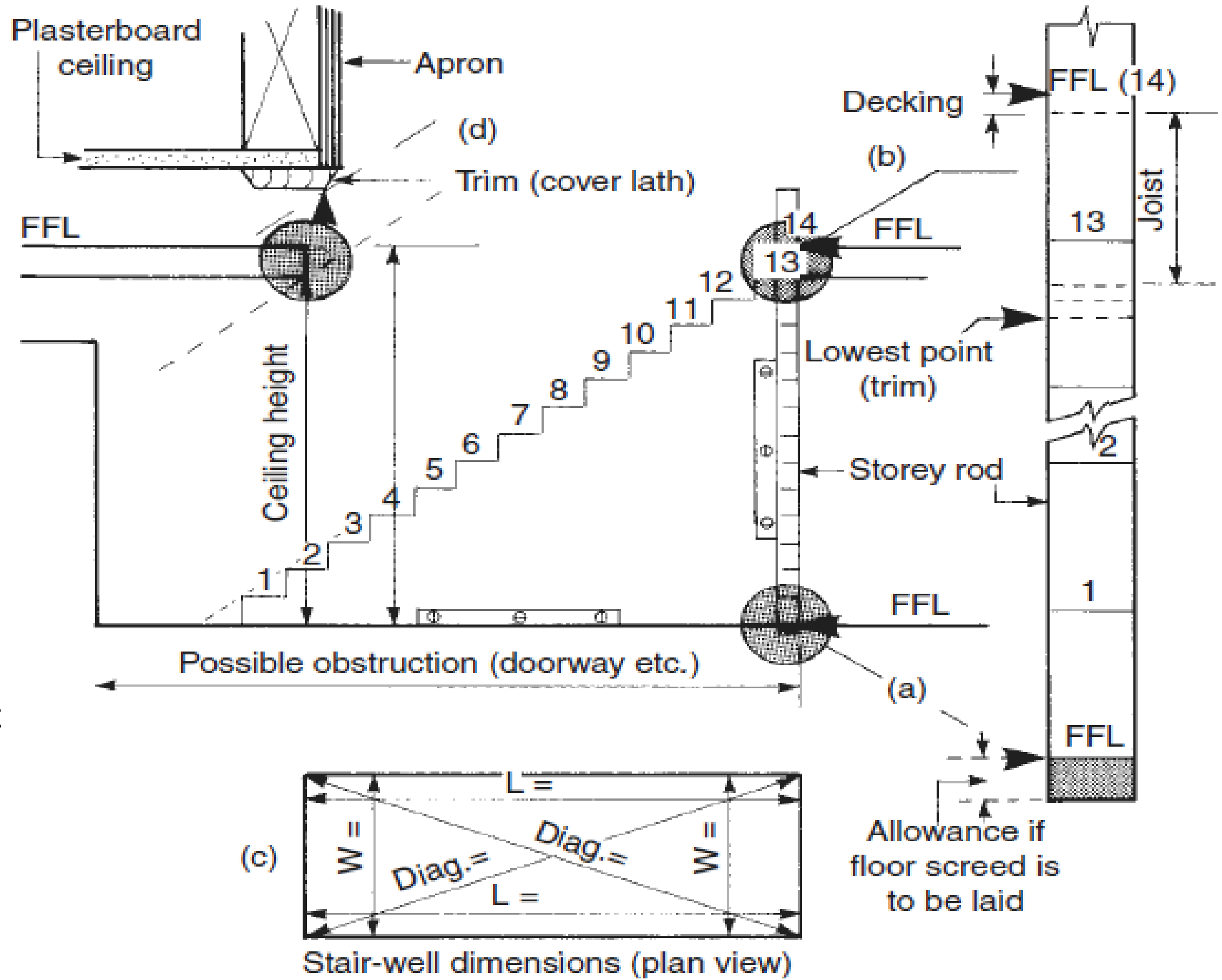


STAIR DESIGN

3

- Stair well
- Overall Rise
- Overall Going
- Minimum landings
- Possible obstructions

- When designing a stairs you must make sure that it conforms to **all** building regulations.



FFL = Finished floor level

4 STAIR DESIGN CALCULATIONS

- When designing a stairs you must make sure that it conforms to **all** building regulations.
- Stairs vary from building to building. It is important to calculate the rise and going to suit the specific building in which the stairs is to be installed to ensure that every rise will be exactly equal.
- The dimensions of the rise and going are calculated in a couple of stages.
- **First** you must consider that there can be no more than 16 risers in any one flight. This means that the overall rise must be broken up into 16 or less individual rises of max height 220mm.
- **Second** there is always one less going than rise, so the overall going has to be broken up by total number of risers less one (i.e. 16 rises = 15 goings, 15 rises = 14 goings, etc). If no overall going is given, care must be taken of bulkheads, landings and door opes.
- **Third, and most important**, you must subject the chosen figures to the maths to check for building regulation compliance.



5 MATHS STAIR CHECK

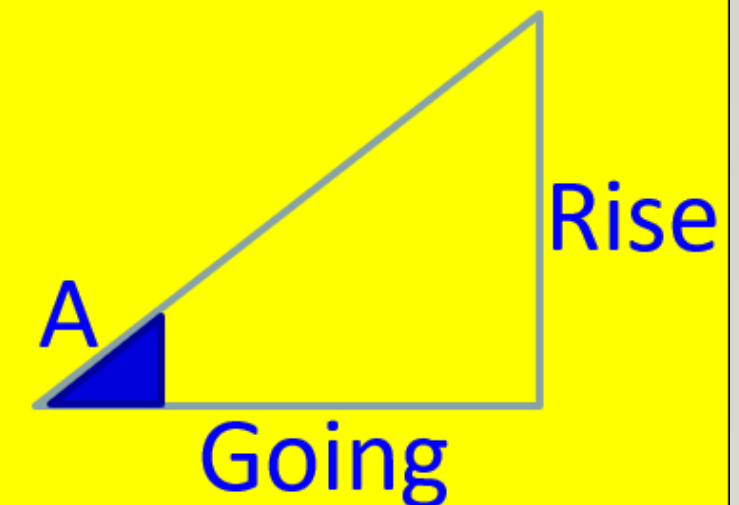
- The two key regulations that must be checked out mathematically to make sure that they comply are:
- Twice the Rise plus the Going must fall between 550 and 700mm

$$(2R + G = 550 - 700)$$

- The Pitch must be less than 42 degrees

To calculate the angle the formula used is:

$$\tan A = \frac{\text{Rise}}{\text{Going}}$$



- **Both regulations (and all other regulations) must be satisfied for the stairs to be deemed acceptable**

- The following examples will demonstrate how this applies:

Example 1:

Rise 180mm, Going 250mm

Example 2:

Rise 210mm, Going 290mm

Example 3:

Rise 210mm, Going 230mm

- The following examples will demonstrate how this applies:

Example 1:

Rise 180mm, Going 250mm

$$2R + G = 550 - 700\text{mm}$$

$$2(180) + 250 = 550 - 700$$

$$360 + 250 = 610\text{mm}$$

Example 2:

Rise 210mm, Going 290mm

Example 3:

Rise 210mm, Going 230mm

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Example 1:

Rise 180mm, Going 250mm

$$2R + G = 550 - 700\text{mm}$$

$$2(180) + 250 = 550 - 700$$

$$360 + 250 = 610\text{mm}$$

$$\text{Tan } A = \frac{\text{Rise}}{\text{Going}}$$

$$\text{Tan } A = \frac{180}{250}$$

$$\text{Tan } A = 0.72$$

$$A = \text{Tan}^{-1} 0.72$$

$$A = 35.754^\circ$$

Example 2:

Rise 210mm, Going 290mm

Example 3:

Rise 210mm, Going 230mm

Both are Acceptable

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$$A = 35.754^\circ$$

Both are Acceptable

Example 2:

Rise 210mm, Going 290mm

$$2R + G = 550 - 700\text{mm}$$

$$2(210) + 290 = 550 - 700$$

$$420 + 290 = 710\text{mm}$$

$$\text{Tan } A = \frac{\text{Rise}}{\text{Going}}$$

$$\text{Tan } A = \frac{210}{290}$$

$$\text{Tan } A = 0.724$$

$$A = \text{Tan}^{-1} 0.724$$

$$A = 35.91^\circ$$

Not Acceptable

(no need to calculate pitch)

Example 3:

Rise 210mm, Going 230mm

- The following examples will demonstrate how this applies:

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Rise 180mm, Going 250mm

$$2R + G = 550 - 700\text{mm}$$

$$2(180) + 250 = 550 - 700$$

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$$\text{Tan } A = \frac{210}{290}$$

$$\text{Tan } A = 0.724$$

$$A = \text{Tan}^{-1} 0.724$$

$$A = 35.91^\circ$$

Not Acceptable

(no need to calculate pitch)

Example 3:

Rise 210mm, Going 230mm

$$2R + G = 550 - 700\text{mm}$$

$$2(210) + 230 = 550 - 700$$

$$420 + 230 = 650\text{mm}$$

$$\text{Tan } A = \frac{\text{Rise}}{\text{Going}}$$

$$\text{Tan } A = \frac{210}{230}$$

$$\text{Tan } A = 0.913$$

$$A = \text{Tan}^{-1} 0.913$$

$$A = 42.397^\circ$$

Not Acceptable

(no need to calculate 2R + G)