HOW DESIGN INFLUENCES COST

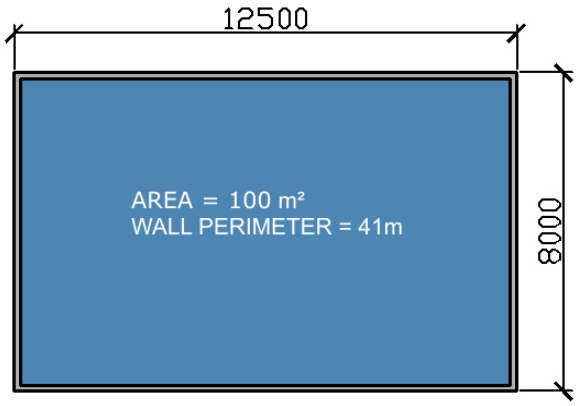
moladi is an affordable housing technology that seeks to reduce the unnecessary costs involved in the construction industry. A key aspect of our function is to educate and guide our clients to optimise their projects by providing them with the knowledge and technology to become more efficient and reduce cost.

Many contractors and clients refer to building costs as a rate per square meter, however, this method of expressing the cost of buildings is not always reliable, although it is the most convenient way for conventional contractors to provide cost comparisons for planning. It is important for people to recognise why this method of costing a structure is largely dependant on the shape, layout, and other variables that are specific to the client's design.

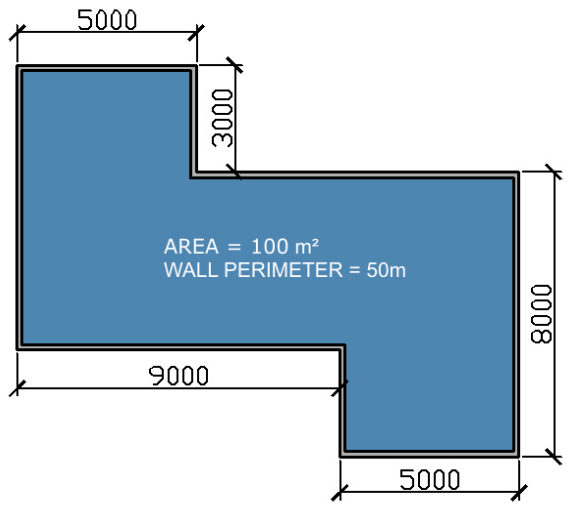
IRREGULAR SHAPED FLOOR PLANS

The overall shape of a building has a marked effect on the total cost of building the structure. It is generally accepted that the more regular the shape of a building is, the more cost effective it would be to build.

EXAMPLES



FLOOR PLAN A



FLOOR PLAN B

Referring to the above examples, both floor plans have the same total floor area, however the cost to build the structure of floor plan B will be higher than that of floor plan A.

The factors influencing the increase in cost between floor plan B, when compared to floor plan A, are attributed to the following factors;

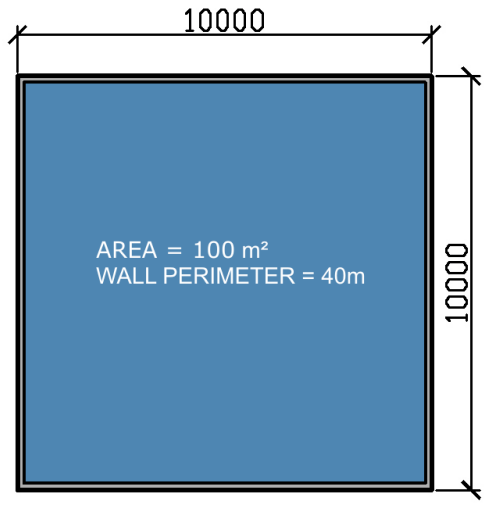
- The perimeter to floor area ratio of floor plan B is higher than that of floor plan A. Floor plan B requires 19.5% more external walling to enclose the same floor area than that of floor plan A.
- The excavation costs for the foundation will increase by between 6% to 20% for floor plan B.
- There is an increase of wall volume of over 22% for floor plan B in comparison with floor plan A. This will result in an increase in material quantities needed for the mortar mix, as well as the amount of formwork, reinforcing and labour required to build the wall structure of the unit for floor plan B.
- The drainage costs will increase by approximately 25% due to the extra rodding and inspection eyes, as well as the extra length of piping needed.
- Other additional costs will also result from other elements of the building, such as the roofing, due to the work being complicated by the shape.

REGULAR SHAPED FLOOR PLANS

Although the illustrations and explanations above have described how irregular shapes of floor plans and designs can effectively increase the overall cost of a structure, regular shapes with longer and narrower proportions are less economical to build.

EXAMPLES

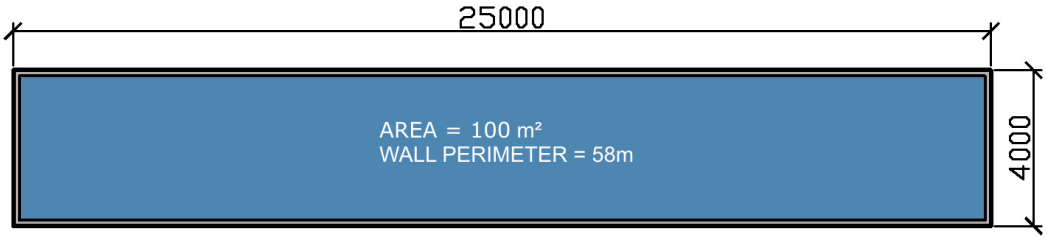
If we assume a cost per square meter of wall area is R140, for a 150mm wall, we are able to calculate the relationship between the below examples in terms of cost.



FLOOR PLAN A

FLOOR PLAN A;

In the case of a 2,7m wall height, the cost per square meter is calculated as follows;
Cost/m² = length of wall x wall height x walling cost per square meter ÷ area
Cost/m² = 40 x 2,7 x 140 ÷ 100
Cost/m² = R151.20



FLOOR PLAN B

FLOOR PLAN B;

In the case of a 2,7m wall height, the cost per square meter is calculated as follows;
Cost/m² = length of wall x wall height x walling cost per square meter ÷ area
Cost/m² = 58 x 2,7 x 140 ÷ 100
Cost/m² = R219.24

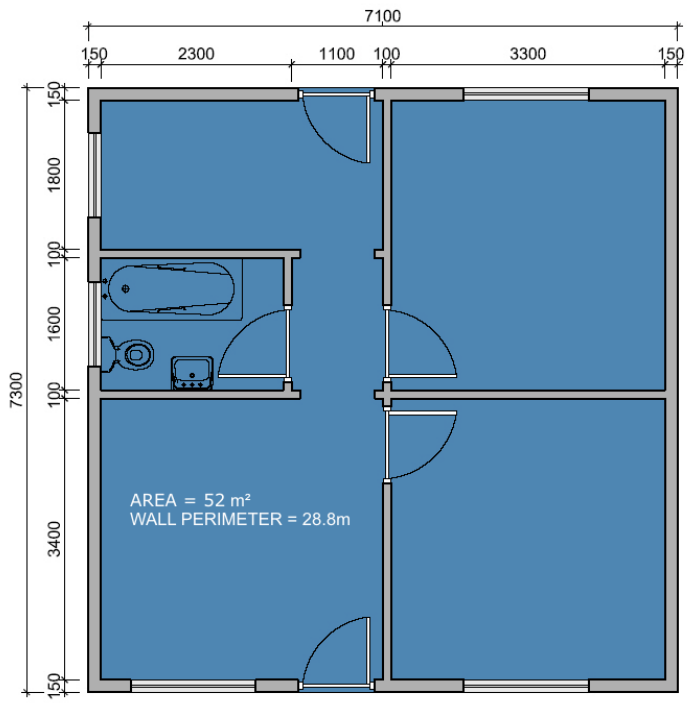
It is important that both the architect/designer and client are fully aware of the additional costs (or savings) that probably will arise from even small changes in the shape of the house. They can then adopt a rudimentary cost benefit approach in considering the advantages of different shapes in seeking a suitable balance between cost, aesthetics and functional aspects.

INTERNAL WALLS AND LAYOUTS

The variable shape and lengths of the internal walls have also been excluded from these examples, however, it has been clearly illustrated how they could potentially affect the cost of building a home.

The design of any structure is a critical phase in the cost implications of your project.

EXAMPLES



FLOOR PLAN A

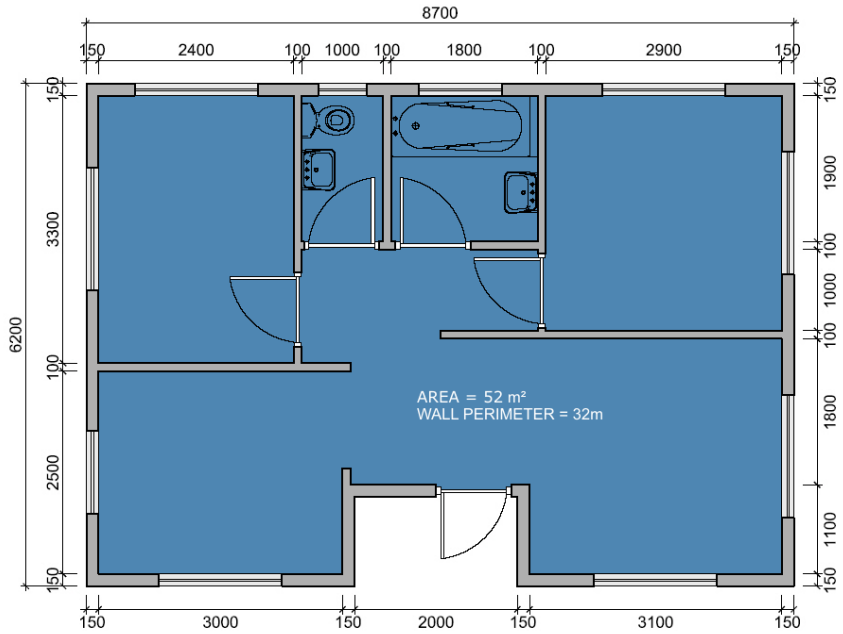
FLOOR PLAN A;

In the case of a 2,7m wall height, the cost per square meter is calculated as follows;
Total Length of 150mm External Walls = 28.8m
Total Length of 100mm Internal Walls = 14m

Calculated Cost per Square Meter;

	Assumed Cost	Quantity	Total
150mm External Wall	R140/m²	77.8m²	R10 892
100mm Internal Walls	R120/m²	37.8m²	R4 536
Bathroom	R10 000	1	R10 000
Internal Doors	R1 300	3	R3 900
External Doors	R2 000	2	R4 000
Window I	R1 500	3	R4 500
Window II	R650	2	R1 300
			R39 128

Therefore the total cost per square meter of floor plan A would be **R757.85**, excluding finishes.



FLOOR PLAN B

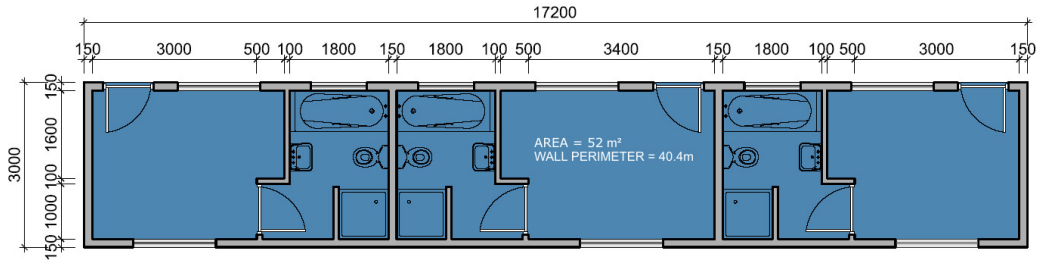
FLOOR PLAN B;

In the case of a 2,7m wall height, the cost per square meter is calculated as follows;
Total Length of 150mm External Walls = 32m
Total Length of 100mm Internal Walls = 18.4m

Calculated Cost per Square Meter;

	Assumed Cost	Quantity	Total
150mm External Wall	R140/m²	86.4m²	R12 096
100mm Internal Walls	R120/m²	49.7m²	R5 964
Bathroom	R15 000	1	R15 000
Internal Doors	R1 300	4	R5 200
External Doors	R2 000	1	R2 000
Window I	R1 500	7	R10 500
Window II	R650	2	R1 300
Window III	R400	1	R400
			R52 460

Therefore the total cost per square meter of floor plan B would be **R1 008.85**, excluding finishes.



FLOOR PLAN C

FLOOR PLAN C:

In the case of a 2,7m wall height, the cost per square meter is calculated as follows;
Total Length of 150mm External Walls = 40.4m
Total Length of 100mm Internal Walls = 9.6m
Total Length of 150mm Internal Walls = 5.4m

Calculated Cost per Square Meter;

	Assumed Cost	Quantity	Total
150mm External Wall	R140/m²	109.1m²	R15 274
100mm Internal Walls	R120/m²	25.9m²	R3 108
150mm Internal Walls	R140/m2	14.6m²	R2 044
Bathroom	R15 000	3	R45 000
Internal Doors	R1 300	3	R3 900
External Doors	R2 000	3	R6 000
Window I	R1 500	6	R9 000
Window II	R650	3	R1 950
			R86 276

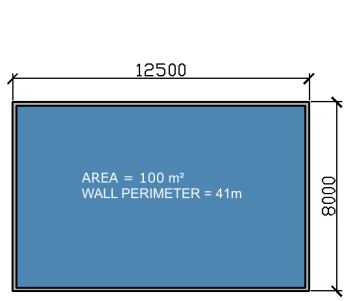
Therefore the total cost per square meter of floor plan C would be **R1 659.15**, excluding finishes.

Although the above comparisons have been roughly estimated with assumed costs, it is generally accepted that a more simplified design, or decrease in detail, will result in a more cost effective rate per square meter.

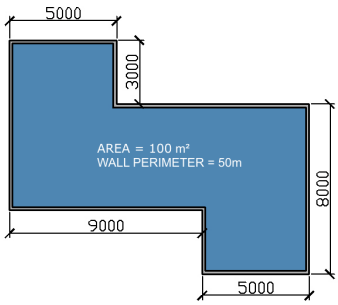
DETERMINING ECONOMICS OF DESIGN

It is not always necessary to request a detailed cost estimate to guage the economical advantages when comparing floor plans. A viable method of briefly calculating the perimeter/floor ratio will be able to indicate the more economical option for your proposal.

EXAMPLES



FLOOR PLAN A



FLOOR PLAN B

FLOOR PLAN A;

In the case of a 2,7m wall height, the perimeter/floor ratio is calculated as follows;

Perimeter : Floor = Area of wall perimeter ÷ Total floor area
Perimeter : Floor = 41 x 2.7 ÷ 100
Perimeter : Floor = 1:0.11

FLOOR PLAN B;

In the case of a 2,7m wall height, the perimeter/floor ratio is calculated as follows;

Perimeter : Floor = Area of wall perimeter ÷ Total floor area
Perimeter : Floor = 50 x 2.7 ÷ 100
Perimeter : Floor = 1:0.35

It is generally agreed that the lower the perimeter/floor ratio, the more economical the design will be. Therefore, again, floor plan A is notably the more economical of the two proposals in this example.

VARIABLES AFFECTING COST

It is very important to mention that the examples above have excluded a number of influential factors in determining the cost effectiveness of a structure. There are a number of aspects that should be considered during the design phase of your project.

1. Floor to ceiling height;
   By increasing the height of the walls, the cost of the structure will increase.

2. Finishing materials;
   The desired finishes for your project should be carefully considered and must be decided on according to the budget. Each item included in the specification will accumulate to contribute to the overall cost of the structure.

3. Building material costs;
   The cost of building materials will vary greatly from country to country, even from city to city. It is crucial that the client should investigate the most economical supplier close to the project site, as every **moladi** cost estimate is calculated with those costs supplied by the client to ensure that the information supplied is as accurate as possible.

4. Amortised cost of the formwork;
   The **moladi** technology is cost effective due to its repetitive application. It is affordable due to the fact that the **moladi** formwork is used on a repetitive basis for up to 50 reuses per kit; this results in the cost of the formwork being amortized over the construction of 50 units. The less re-uses the purchased formwork kit has the greater the overall cost of a single unit.

5. Duration of construction;
   A key aspect of savings is the speed of construction. Less time on site, or the faster the project is completed, results in a more economical project and greater savings.

6. Labour;
   With a shorter duration of construction, the cost of on-site labour per structure will be drastically reduced. The amortisation of the **moladi** technology allows for labourers to move from one construction site to another, ensuring that their employment is secured.

We encourage our clients to understand the importance of cost effective design that is balanced with aesthetics and social acceptability.