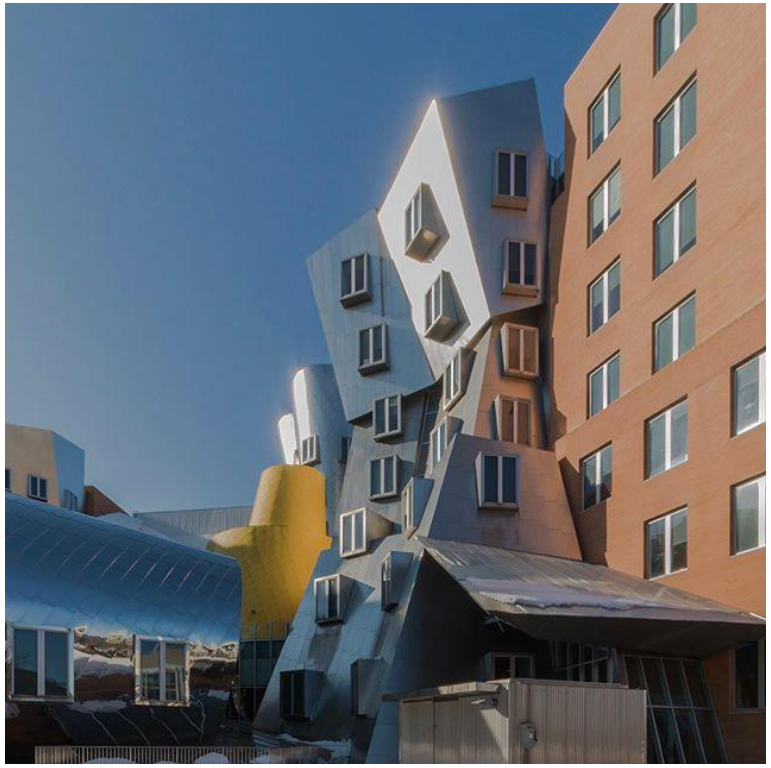
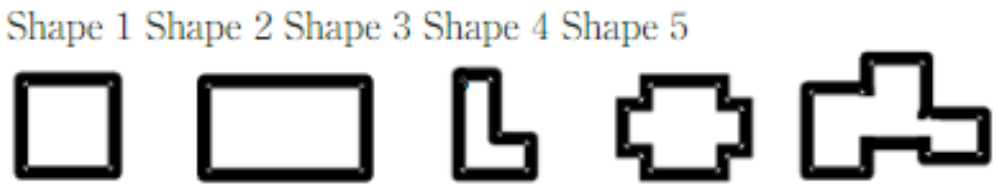
Cost Parameters

Cost Parameters of buildings

- Building shapes
- Building heights
- Enveloping area
- Structural elements
- Service finishes
- Architectural features
- Initial and maintenance cost



Building shapes



- Irregular and complex shapes have higher the costs
- An irregular shaped building will have an adverse effect on the cost of floor construction due to the floor construction being more complicated.

High perimeter to-floor ratio high unit construction costs (Square is cheapest ratio of 1)

- High quantities of finishes and decorations like paints and plaster.
- Increased volume of external enclosing block walling.
- Increased heat loss surface area.
- Change in foundation quantities
- Longer service and waste pipes
- Chances of extra doors & windows

Building heights

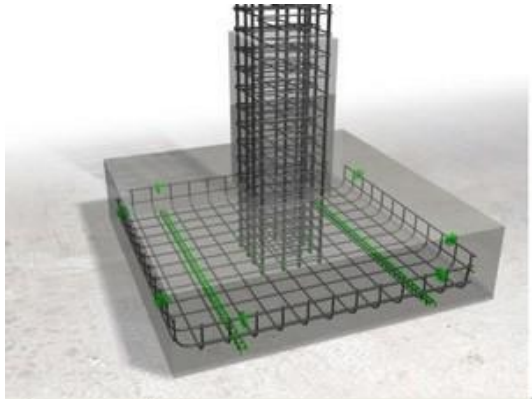
- Generally there are cost items which fall as the number of storeys increases, those which rise, those which fall initially and then rise and those unaffected by height.

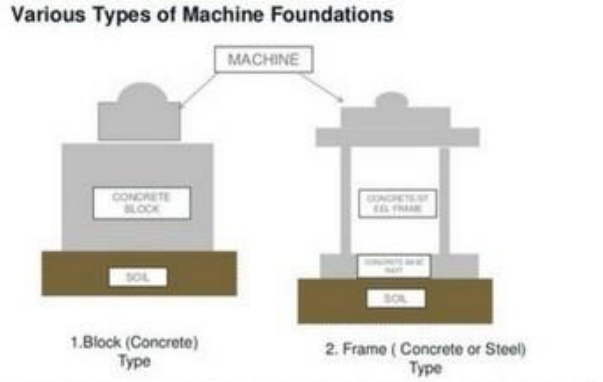
Foundation costs decreasing	**Beyond a certain number of storeys the form of construction changes and costs rise**	**Cost varies with the type, form and construction of the building.**	**Air conditioning costs likely fall.**	**Sophisticated equipment (wet or dry risers & sprinklers) increase**

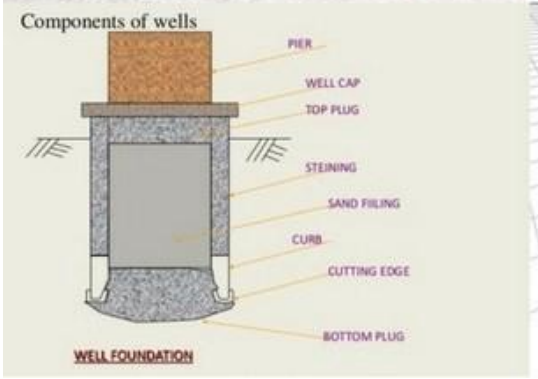
- High construction costs for <u>high storey heights</u>

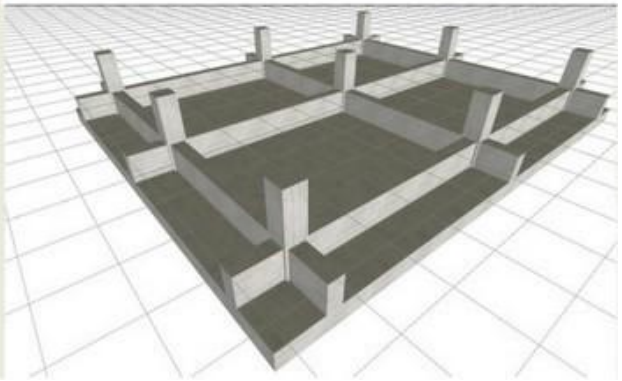
Increased volume of heating and longer lenghts of pipes or cables.	**Longer service and waste pipes to supply sanitary appliances.**	**Higher roof costs due to increased hoisting**	**Increased staircases and lifts costs**	**Cost in applying finishes &decorations high working at high levels**

- Foundation costs/sq.m of floor area will fall with increase in the height of the building provided the form of the foundation remains unchanged









Reasons for high cost of tall buildings

- *Cost of special arrangements to service the buildings such as lift, water pumping, break fall of sewage and rubbish coming down*
- *Special ventilation and lighting arrangements to serve the building are needed because of the impossibility of providing adequate light wells*
- *High standard fire-resistant construction and escape arrangements are required*
- *Lower part of the building to be able to carry the weight of the upper storey's, which obviously makes it more expensive than if it were carrying its own weight alone*
- *Structure of the building & its cladding will have to be designed to resist a heavy wind loading*

ENVELOPING AREA

The envelop of a building means it is the external walls and roof that enclose it.

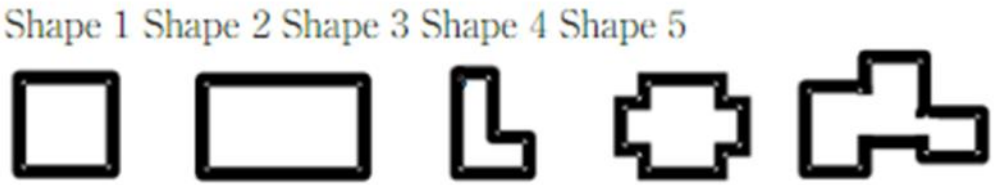
It is an important factor in determining the cost of a building.

For example , a square building is inherently economical in its wall area ,but the total cost is determined based on the number of stories that it is chosen for the accommodation.

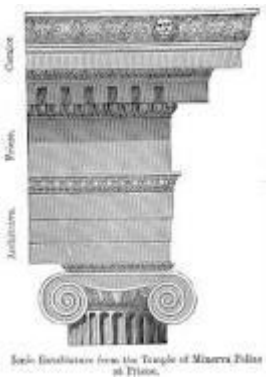

ONE
WAY

- Different classification of roof have different of function and cost for each roof.
- Materials for build each roof between pitched roof and flat roof are totally different materials.
- Total cost of roof depends on the classification of roof.

- Shape of roof depend on building shape, roof must cover the building.
- If the shape of roof is complicated, it will increase the cost especially the pitched roof.



ARCHITECTURAL FINISHES



- The requirement on aesthetic of design will influence the selection of windows and external doors.
- Building with higher requirement on aesthetic value intends to allocate higher budget on the elements such as windows, doors and finishes.

CHOICE OF MATERIALS

- The materials specified and the proposed construction details will have an important bearing on the cost of the project.
- The relationship of quality to cost has been commented on above, and buildings which incorporate high quality and/or innovative features are invariably more expensive than those which are purely functional.
- The choice depends on what the client is willing to pay.
- The choice of the material, and hence the cost, may be influenced by factors other than aesthetic qualities.

COST PARAMETERS IS BASED ON STRUCTURAL ELEMENTS

Foundation

- Foundation depends upon the character of soil.
- Site selection is factor depending upon which type of foundation should be given.
- Pile foundation, isolated foundation, strip foundation, shallow foundation are different types of foundation.
- Piling is the most expensive solution and is normally employed only where conventional foundation are impossible because of depth at which bearing foundation exists combined sometimes with waterlogged nature of ground.

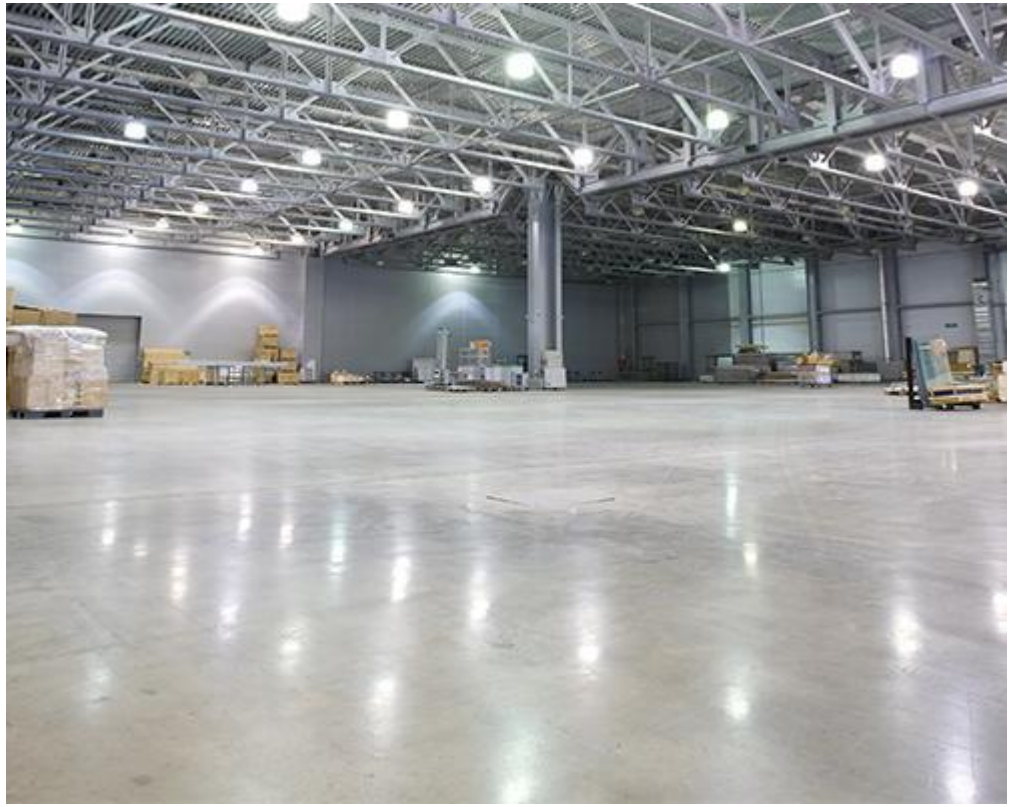
- Beams
- Columns
- Arches
- Pillar

Parameters affecting the cost of the structural system are: (a) Cost of steelwork (cost of beams, angle columns, internal columns, middle columns and shear connectors), (b) Cost of reinforced concrete (cost of reinforcement and concrete), (c) Cost of erection of steelwork.

SERVICE FINISHES

Three kinds of finishes are :

- ceiling finishes
- floor finishes
- wall finishes



CEILING FINISHES

FACTORS AFFECTING THE COST OF CEILING FINISHES

- -Type of structure
- -Appearance
- -Durability
- -Fire resistance
- -Lifespan
- -Need for acoustic elements.

Floor finishes

Factors effecting the cost of floor finishes

- Type of base
- Area of room
- Degree of comfort required(Sound control, freedom from slippenness, warmth)
- Maintenance(clearing, repairing)
- Appearance
- Individual preference

wall finishes

Factors effecting the cost of wall finishes

- Type of finish needed
- Area of walls
- acoustical qualities needed
- Maintenance(clearing, repairing)
- Appearance
- Individual preference

- Cost of internal wall finishes will spend much for aesthetic requirements as required by the client. Factor to consider are its color, texture, pattern and the way it meets and joins with other materials.

Cost of building viewed in two contexts–

:- Initial Cost of building- --short term cost

Life cycle cost of building--- Long term cost

Initial Cost --- cost which goes into making of the building

Whole life cost of building includes:- Cost which is incurred over the entire life span of building and includes--

the initial cost of building

operational cost of building- HVAC, lighting, water supply etc

Cost of maintenance -- parts replacement cost

Disposal cost or salvage value

--Depends on useful life of building

--To promote economy in building– Life cycle cost of building would be critical

- Life cycle cost helps in promoting cost-effective living rather than cost-effective housing

INITIAL COST

- The capital cost for a construction project includes the expenses related to the inital establishment of the facility:

- Land acquisition, including assembly, holding and improvement
- Planning and feasibility studies
- Architectural and engineering design
- Construction, including materials, equipment and labor

- Field supervision of construction
- Construction financing
- Insurance and taxes during construction
- Owner's general office overhead
- Equipment and furnishings not included in construction
- Inspection and testing

Cost Classification

- Direct Cost
  - Labor Cost
    - Direct Labor
    - Indirect Labor
  - Material Cost
  - Equipment Cost
  - Subcontractor Price
- Indirect Cost (i.e., Job Overhead)
  - Project Overhead
- Markup
  - General Overhead
  - Profit
  - Contingency

Source: Shtub et al., 1994

Cost Classification - Direct Cost

Labor Cost

Direct Labor Cost

- Difficult to evaluate precisely but all effort is done to get an accurate estimate as possible
- Greatest amount of uncertainty in project estimation

Indirect Labor Cost

- Costs that are additional to the basic hourly rates (e.g., tax, insurance, fringe benefits)
- Substantial in amount: add 25 to 50 percent to direct labor costs
- Commonly used approach adds indirect labor costs as a percentage to the total direct labor costs or for each major work category

Source: Clough et al., 2005; Barrie & Paulson, 1992

Material Cost

- All materials that are utilized in the finished structure.

Equipment Cost

- Costs Includes: ownership, lease or rental expenses, and operating costs

Subcontractor Price

- Includes quotations from all subcontractors working on the project
- Quotations submitted by the subcontractor usually require extensive review by the general contractor’s estimator to determine what they include & do not include

Cost Classification – Indirect Cost

- Project Overhead (i.e., Job Overhead)
  - Costs that do not pertain directly to any given construction work
  - Generally constitutes 5-15 percent of the total project cost
  - Costs computed by listing & evaluating each item of overhead individually

Source: Clough et al., 2005

Examples of typical items included:

- Job Mobilization, Project Manager, General Superintendent, Nonworking Foremen, Heat, Utilities, Storage Buildings, Field Office Supplies, Job Telephone, Computer Equipment & Software, Computer Networking & Internet Connectivity, Small Tools, Permits & Fees, Special Insurance, Builder's Risk Insurance, Security Clearances, Material & Load Tests, Storage Area Rental, Protection of Adjoining Property, Field Offices, Parking Areas, Legal Expenses, Surveys, Engineering Services.

MAINTENANCE COST OF BUILDING

- Design indicators for maintenance cost are height parameters, shape, area of window, area of floors, number of storeys and the age of building
- The analysis of data collected revealed that more maintenance cost is expended in the mechanical services than electrical services.

- The analysis further indicated that the maintenance cost of mechanical services is determined by the following design variables height, shape and perimeter of the building.. it was also found that height is the determinant of maintenance cost of electrical services.
- The overall maintenance cost of the engineering services were found to be a function of height and perimeter of the building

- The operation and maintenance cost in subsequent years over the project life cycle includes the following expenses:
- Land rent, if applicable
- Operating staff
- Labor and material for maintenance and repairs
- Periodic renovations
- Insurance and taxes
- Financing costs
- Utilities
- Owner's other expenses