

AMIRAJ

COLLEGE OF ENGINEERING & TECHNOLOGY

Module - 5 Advancement in Civil Engineering



Subject:- BCE
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AMIRAJ
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Smart City

- A city which equipped with basic infrastructure so as to provide a decent and quality life, a clean and sustainable environment of some smart solution is called as a smart city.

Salient Features of Smart city

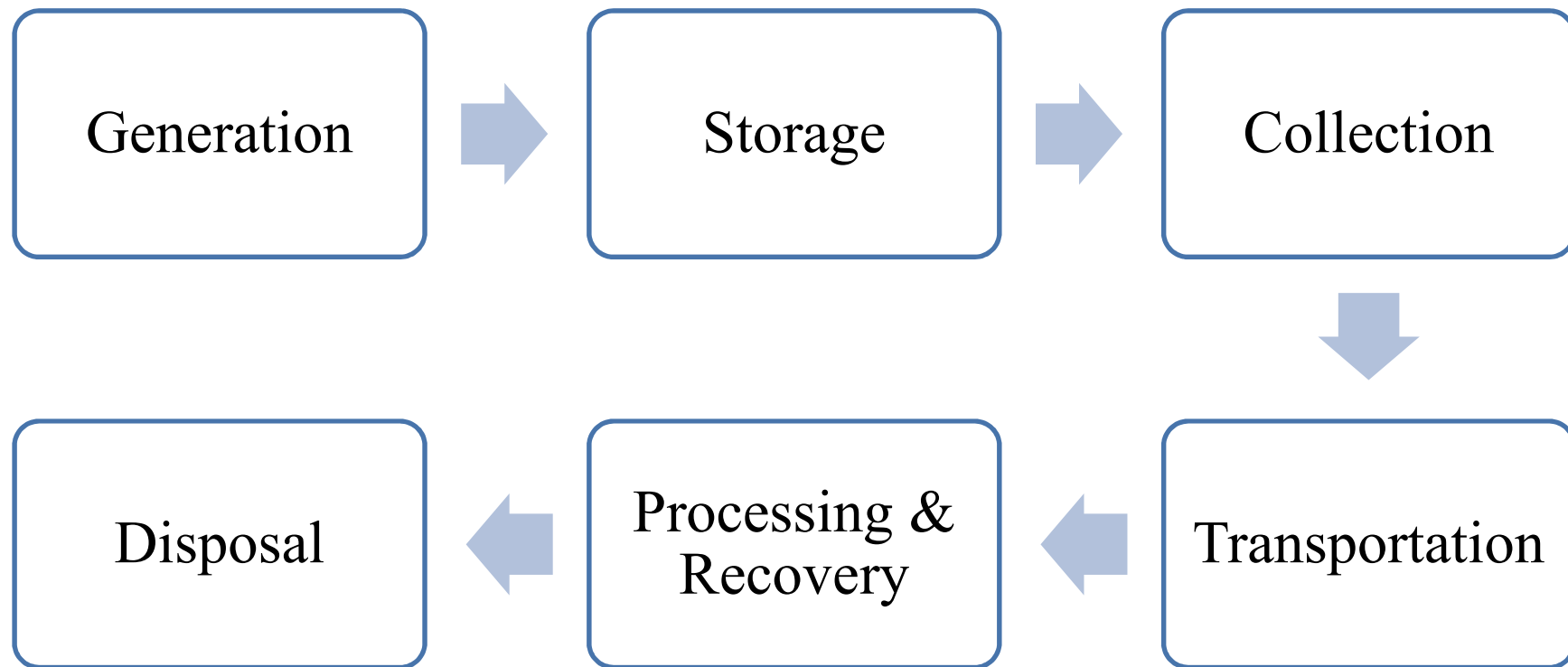
- Assured water supply
- Assured electric supply
- Proper sanitation
- Proper solid waste management
- Arrangement of Public transportation
- Affordable housing
- Sustainable environment
- Health and education
- Eco friendly atmosphere

- Smart traffic System
- Quick Accident relief.
- Use natural Energy Resources
- Developing open space for park and playground.

Objectives of Smart City

- To provide Basic infrastructure
- To provide quality life
- To provide clean environment
- To apply smart solution

Solid Waste management system



Constituents of Solid Waste

House Refuse

- Ashes, Demolition of Structure, Vegetable & animal waste

Street Refuse

- Empty Packets, Dirty material from vehicles, Empty match box
- Free leaves

Trade Refuse

- Solid waste from factories, business centre

Source of solid Waste

Residential

Institutional

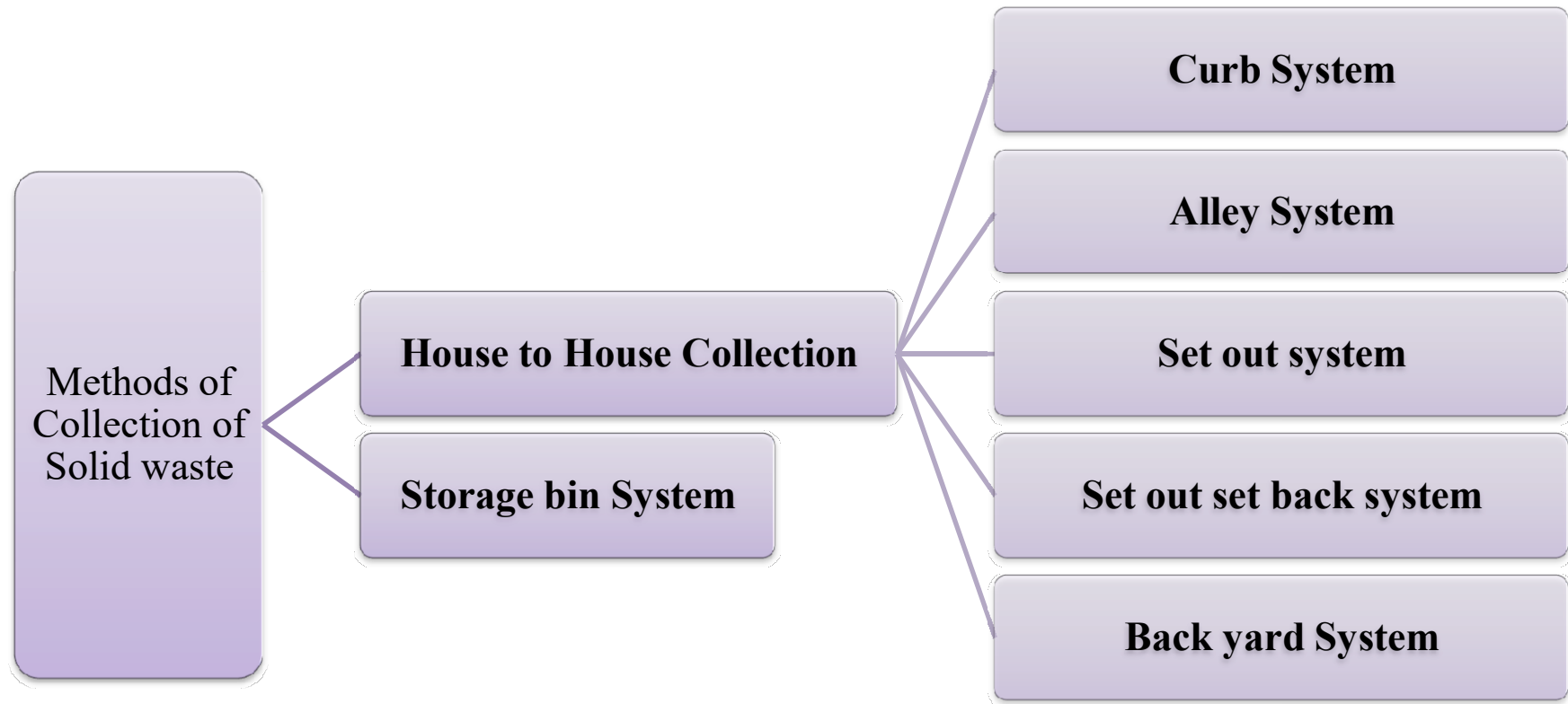
Commercial

Industrial

Agriculture

Municipal

Method of Collection of Solid Waste



Methods of Treatment of Solid waste

Mechanical Volume
Reduction

Thermal Volume Reduction

Manual component
Seperation

Mechanical Volume Reduction

- Also known as compaction method.
- Useful for land fill

Thermal volume reduction

- Combustion the waste material
- More than 90% Waste can be reduced by this method

Manual component separation

- Separation of solid waste can be done by following
 1. Where Solid waste generated
 2. At a transfer station
 3. At a centralised processing station
 4. At the disposal site

Disposal Method

Sanitary Landfill

Incineration

Composting

Trenching

Dumping in to sea

Grinding

By Salvaging

Mass Transportation System

Mass Transportation System

1. Tram
2. Light Rail
3. Metro
4. Monorail
5. Commuter Rail
6. Local rail
7. Bullet train
8. BRTS

Bus Rapid Transit System (BRTS)

- BRTS in which separate road track or road is given to improve capacity of bus system.
- Aim of BRTS is to combine the capacity and speed of a buses or a metro with flexibility, lower cost and simplicity of a bus system.
- Frequency is better
- Easy driving condition

Man features of BRTS

1. Dedicated lanes (Separate Road)
2. Busway alignment (Kept Away From busy road ways)
3. Off-board Fair collection (Ticket amount given on station only to save time)
4. Saving time
5. Intersection treatment (Extending green Signals & reducing Red signals)
6. Platform level boarding (Station platform should be levelled with Bus floor)

Metro or Rapid Transit

- Advance mode of transportation
- Better transport services
- Metro System is Underground, Tube, Elevated track is used.
- Metro word used in India instead of Metropolitan
- Subway word used in America
- Rapid Transit word used in London
- U-Bahn word used in Germany
- MRT (Mass Rapid Transit) word used in South Asia

Rain Water Harvesting

Introduction

- Storage of Rain water
- Domestic, agriculture and industrial use
- Use in non rainy day or non rainy year

Component of Roof Top Rain Water Harvesting

1. Catchment (Rain Water Receive area)
2. Coarse mesh (Provide at a roof to prevent debris)
3. Gutter (To collect & Transport Rain water to storage tank)
4. Conduits (PVC Pipe lines)
5. First flushing (Flush Catchment area)
6. Filter (Remove Pollutants)
7. Storage facility (Store rain water)
8. Recharge structure (Charged ground water)

Purpose for rain water harvesting

- To provide sufficient water for drinking
- To provide sufficient water for irrigation purpose
- To provide sufficient water for ground water recharge purpose.

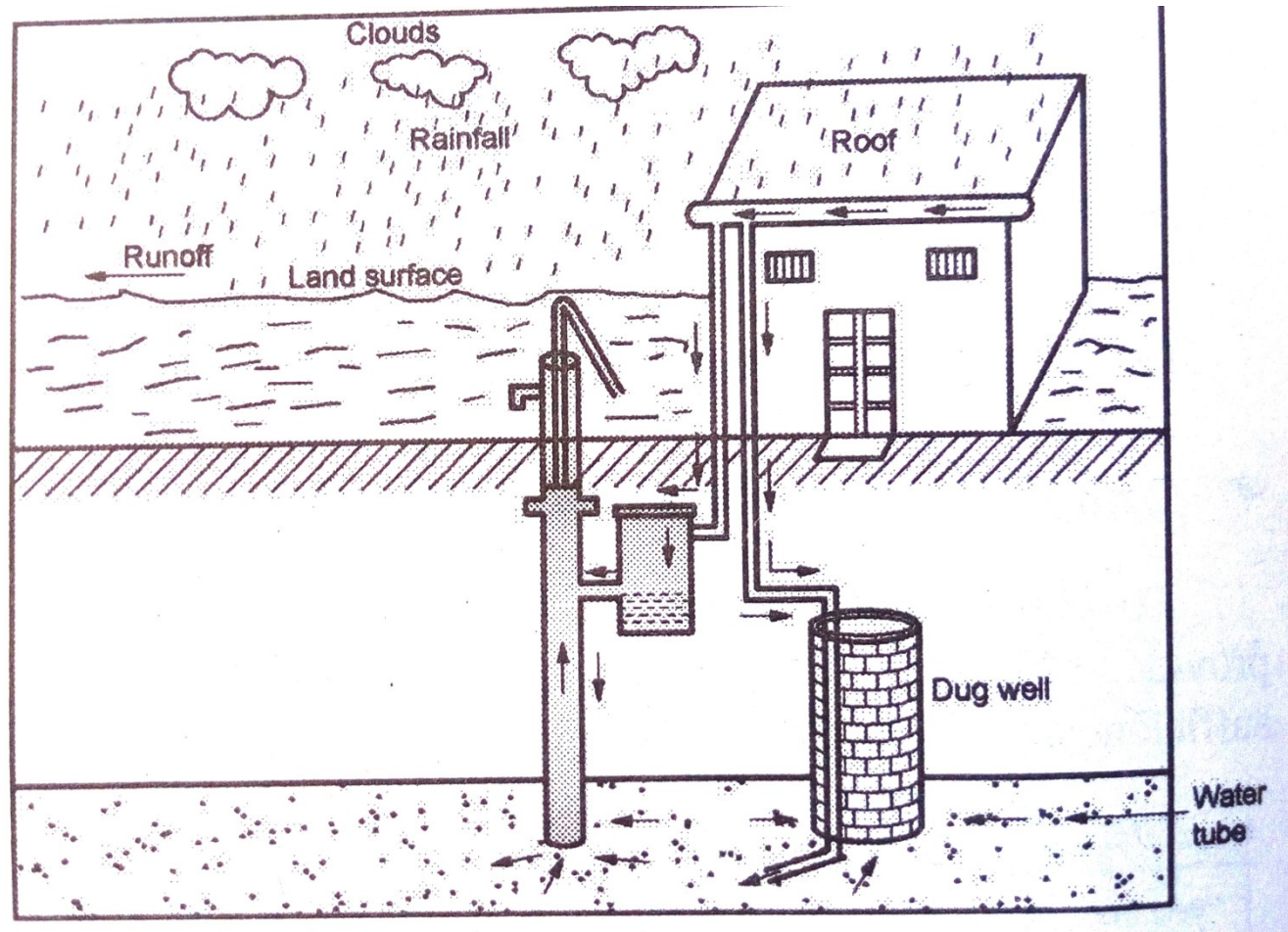
Necessity of Rain water Harvesting

- We use secondary source of water (River, Lake, Under ground water) in Place of Primary Source of water (Rain Water)
- Surface water (Rain water) we use by harvesting.

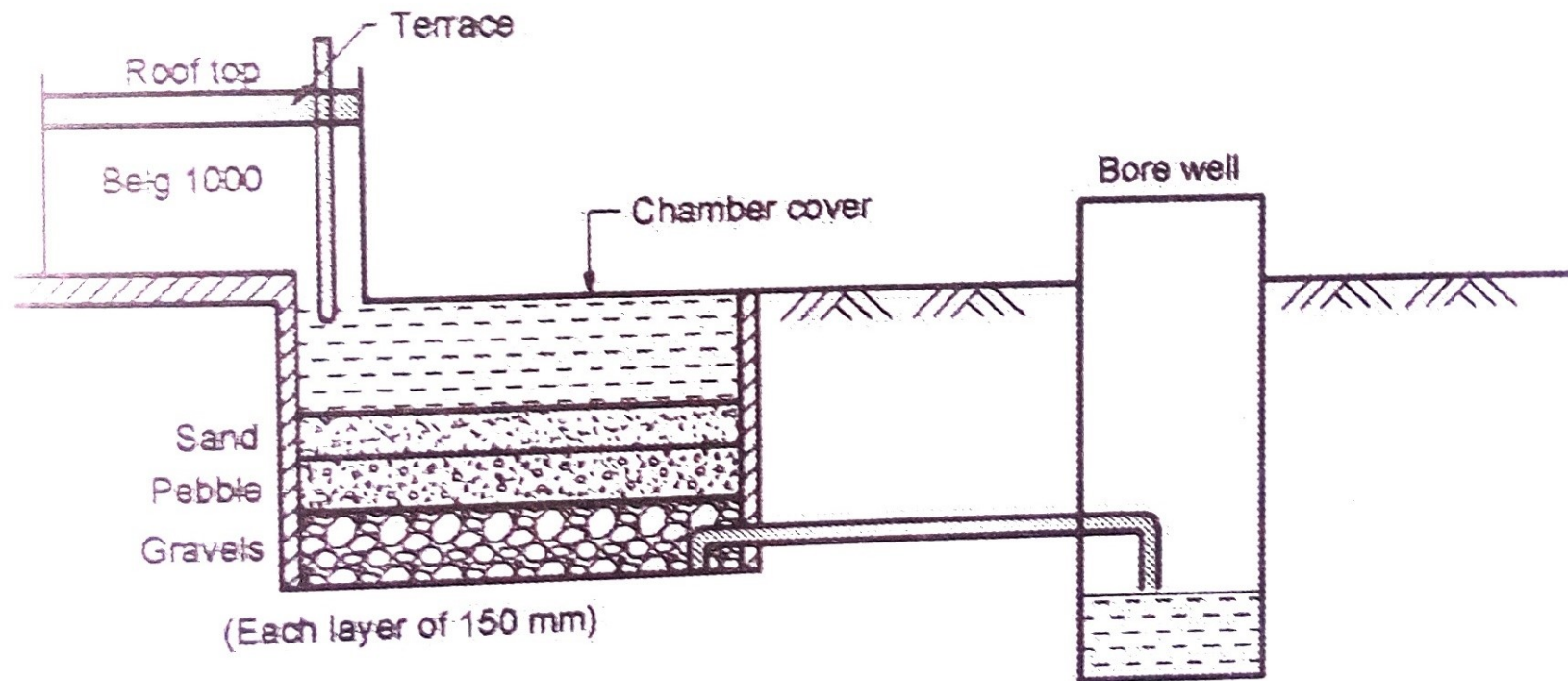
Methods of Rain water harvesting

1. Capture the rain fall from the roof top
2. Capture the runoff from local catchment
3. Capture the seasonal flood water sheds area

Rain water Harvesting in Rural Area



Rain water Harvesting in Urban Area



Watershed Management System

- Distribution of Resources
- The management process include water supply, water quality, drainage system.
- It covers overall planning and proper utilisation of natural resources

Objectives of Watershed Management System

- To control damaging runoff
- To manage and utilize the runoff water (Surface Water)
- To reduce flood Peaks
- To improve infiltration process of rain water.

Need of Watershed management system

- To protect soil
- To increase infiltration
- To increase water holding capacity

Energy Efficient Building

Energy Efficient Building

- Proper utilization of natural resources like Sunlight, Wind, in the building planning so as to minimize the consumption of the energy and make a healthy home is called energy efficient building

Factors to be considered for Energy Efficient Building

1. Building system
2. Project Management
3. Foundation
4. Walls
5. Floors
6. Roof
7. Doors and window
8. Mechanical
9. Electrical

Green Building

Green Building

- Green buildings are the structures that ensure efficient use of natural resources like building material, water, energy and other resources with minimum waste generation.
- Green buildings have a smarter lighting system that automatically switch off when no one is present inside the room.

Necessity of Green Building

- To prepare building structure beautiful
- For energy saving
- Intelligently monitor and control resource uses.
- Recycle material can be used directly.

Benefits of The Green Building

- Green building consume 40 to 60% less Electricity as compare to conventional building
- Green building generate lesser waste during the construction time.
- Green building ensure proper safety, health and sanitation system.
- Green building construction cost pay back within in 3 to 4 year

Salient features of Green Building

- 100% water recycle
- 50% in water saving
- Reduction in requirement of water by 35 to 40%
- Application of fly ash and cement block
- Roof Gardening
- Maximum Utilization of daylight
- Use of Cavity wall

- Solar thermal heating for hot water requirement
- Use of board for partition (Generally agriculture waste material)
- Use of wind turbine
- Use of solar Light

Some Reasons why concept of Green building Plan

- For the optimum use of Energy of Power
- For water saving
- For waste treatment and reuse
- To minimize demand of non-renewable energy sources.
- To minimize concrete use

Development of River front

River Front

- Land or Property along side of river is called river front.

Types of Riverfront Development

1. Cultural riverfront (Festivals, Artistic Expression)
2. Environmental riverfront (Health & Clean environment)
3. Historic Riverfront (Cultural Heritage of Place)
4. Mixed use River front (Use for Various activity)
5. Recreational River Front (Garden, Cycling, Walking, Gathering etc...)
6. Residential River front (Houses, Restaurants)
7. Working River Front (Fishing, Boating)

Advantages of River Front Development

- Job Creation
- Source of revenue for Government
- Development of Tourism
- Water Conservation
- Land Development
- Maintain River bank
- Flood Control
- Provide open space for recreation activity
- Create healthy environment

River front development in India

- Yamuna riverfront development project
- Brahmaputra river front development project
- Gomti riverfront development project in Lucknow
- Pune riverfront project in Maharashtra
- Godavari riverfront project of Nasik, Maharashtra.
- Mithi riverfront development project
- Sabarmati riverfront at Ahmadabad in Gujarat.

Heritage Structure

Heritage

- Features belongs to the culture of a particular society such as tradition, language, building etc. Which were created in past and still have historical importance is called heritage.

Heritage structures in India

- Tajmahal at Agra
- Shaniwar wada at pune
- Many forts in Maharashtra, Rajasthan, Gujarath, etc.
- Palaces in Rajasthan and many other in other state

- **Heritage structure in Mumbai**
- Chhatrapati shivaji terminal
- Gateway of India
- The Taj hotel or Tajmahal palace
- David Sassoon Liabrary
- Flora fountain
- Municipal corporationn

- **Heritage structure in India**

- Qutub minar
- Humayun's tomb
- Mahabodhi temple
- Churchees
- Rani ki vav
- Virupaksha temple, Hampi

- **Heritage structures in Gujarat**

- Rani ki vav
- Adalaj stepwell
- Jama mosque
- Teen Darwaza
- Ahmad Shah's Tomb
- Dada Harir stepwell
- Sidi Bashir mosque
- Sidi saiyyed mosque

Earthquake Resistant Structure

Features of Earthquake Resistant Structure

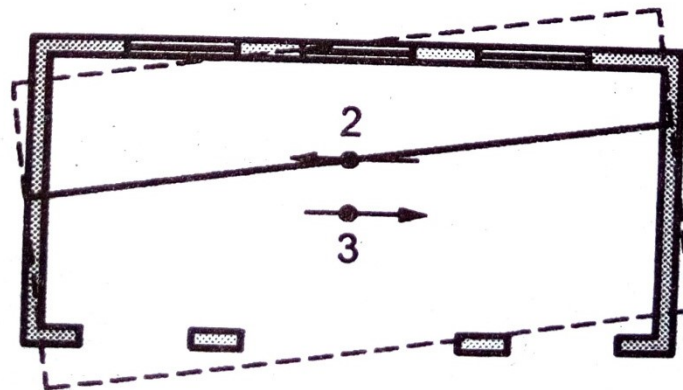
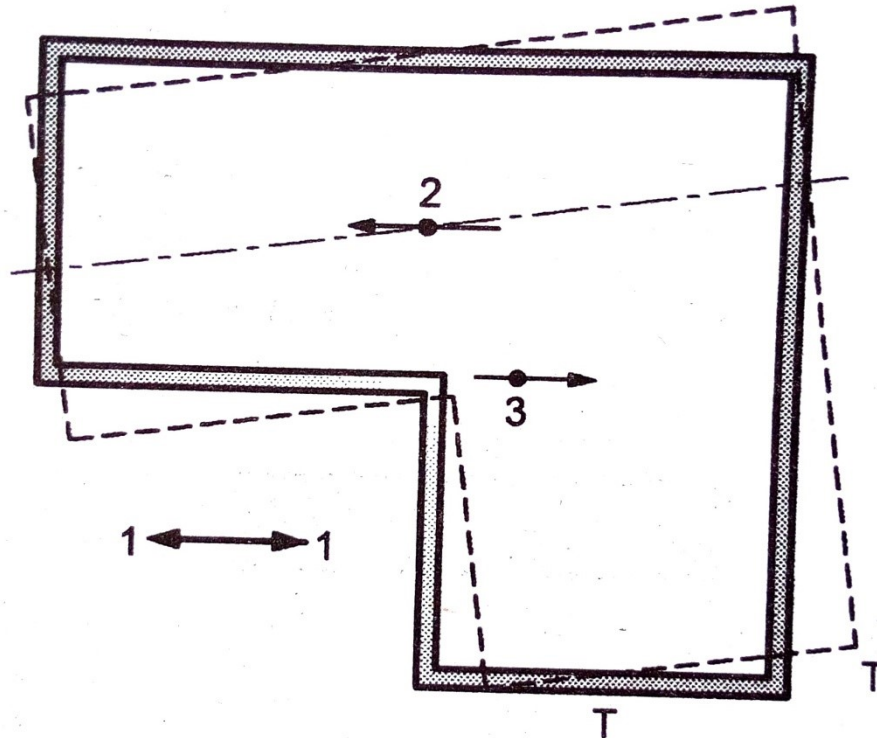
- Need of Earthquake Resistant structure
- Symmetry
- Regularity
- Separation of Block
- Simplicity
- Enclosed Area
- Separate Building For Different Functions

- Lightness
- Continuity of contraction
- Projections
- Shape of Building
- Ductile
- Fire safety Provision
- Adequate strength
- Domes

Need For Earthquake Resistant Building

- To Reduce Horizontal and vertical vibration
- Save building structure
- Reduce Damage of Building

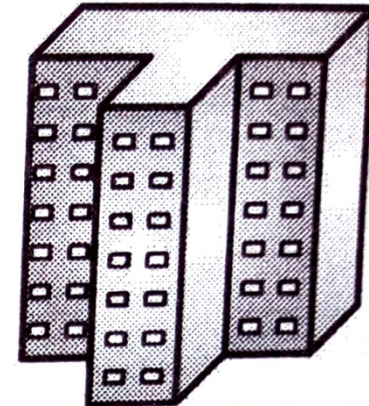
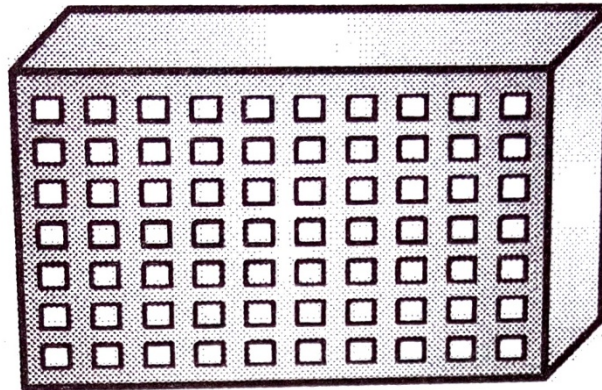
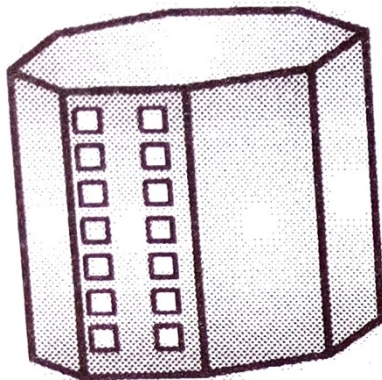
Symmetry



- 1 - Earthquake force
- 2 - Centre of stiffness or resisting force
- 3. Centre of gravity or the applied inertia force
- 4. Twisted building

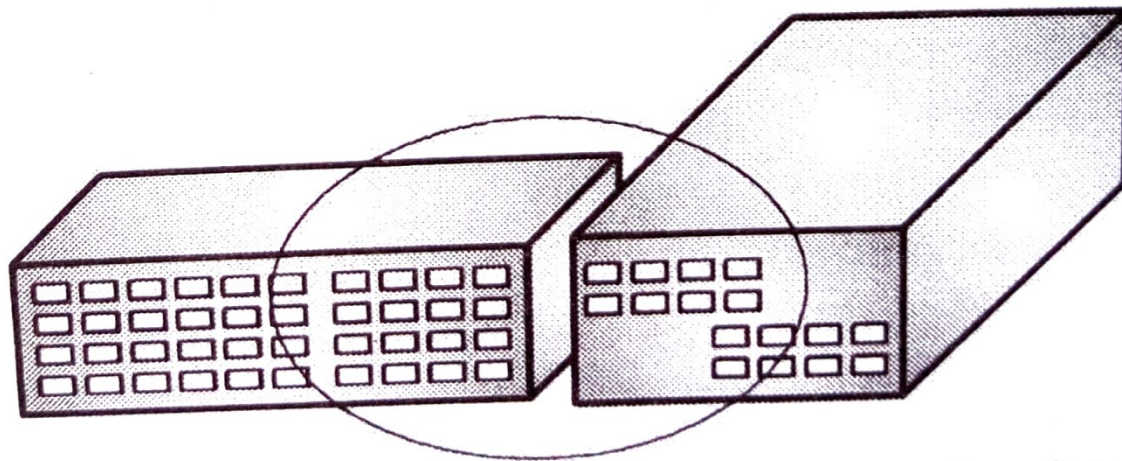
Regularity

- Simple Rectangular shape behaves better in earthquake
- Torsional effect of ground motion are pronounced in narrow rectangular blocks.
- Restrict the length of block three times its width.



Separation of Block

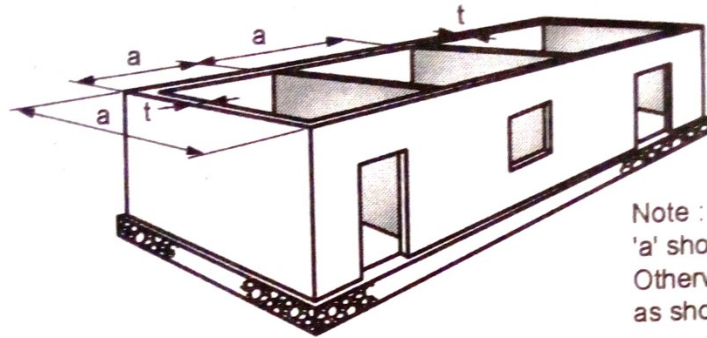
- Large building is divided in to number of parts or blocks.
- 3 to 4 cm gape provided between two blocks.
- Expansion joints are covered with weak material.



Simplicity

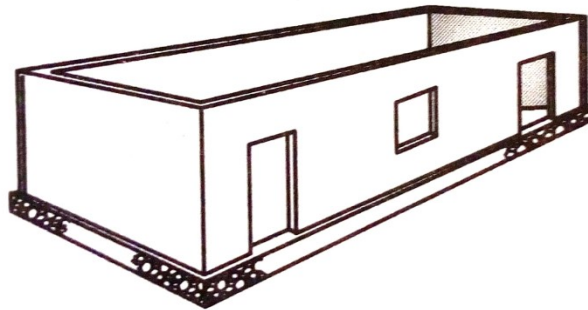
- Ornamentation are undesirable from seismic point of view.
- If ornamentation is insisted, it must be reinforced with steel, which should be properly tied with main structure.

Enclosed area

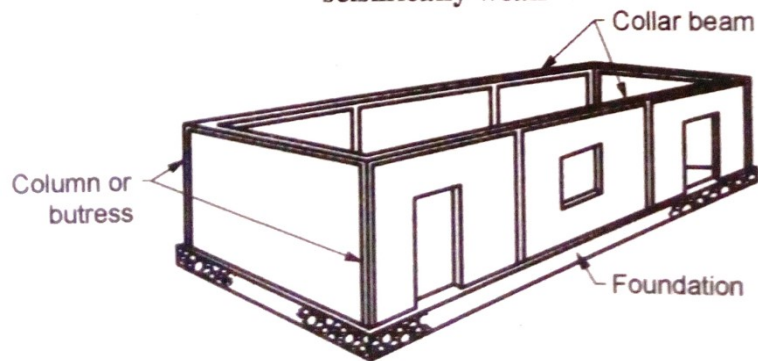


Note : For 't' thickness of walls, 'a' should be such that $a/t \leq 40$. Otherwise framing be used as shown at (c)

(a) Many crosswalls, small boxes, seismically strong



(b) No crosswall, large box, seismically weak



(c) Wall with framing elements, usually reinforced concrete

Separate Building for different function

- Hospital, School, Residence, Assembly, Security building etc. Are construct seperatly

Lightness

- Construct your building as light as possible in weight for safety against earthquake.

Continuity of Contraction

- The various part of building should be so tied that the building should be act as a one unit.

Projection

- Projection should be tie with main structure.
- Apply very thin plaster

Shape of building

- Rectangular or Symmetrical structure have more resistant to earthquake force.
- Length of Building should not increase three time width of building.
- L, T, E, Y, H is different shape of building and each part is divided into rectangular block

Ductile

- The Building Should be designed as a Ductile.
- This enables structure to absorb energy during earthquake.
- Minimize the probability of sudden collaps of structure.

Fire Safety Provision

- Material used in Building is fire resistance material.