2019-20

SANDARBH

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Contents

Message

Technical Education is the most potential instrument for socio-economic change. Presently, the engineer is seen as a high-tech player in the global market. Distinct separation is visible in our education between concepts and applications. Most areas of technology now change so rapidly that there is a need for professional institutes to update the knowledge and competence.

I sincerely advise the young engineers to face the major challenges of industry with a persistent search for innovation of achieving economy and improved durability. I am delighted to note that the engineering graduates have been able to demonstrate their capable identities in different spheres of life and occupied prestigious positions within the country and abroad.

At last
Think happy. Act happy. Be happy.

Dr.Archan Keerti Chowdhary
Principal

Editorial

It has given enormous gratification to coordinate the editorial team of —SANDARBH‖ , our Civil Engineering Department‘ magazine in all aspects, covering academic activities, technical events of the students in contributing articles to the magazine.
This magazine would not have been concluded without the constant support of our principal who
stood as a pillar of strength and support at all times. We would genuinely place thanks to our editorial team whose dedication and diligent towards completion of magazine was always part of
the process. We would like to congratulate and express our hearty thanks and gratitude to our head of the department in believing the quality policy of educate enrich and excel in imparting professional education. This magazine is reflecting of our department quality in terms of all round excellence.
Last but not the least we want to express earnest gratitude to all the faculty members who gave
constant support and guidance to enlighten young minds of the people through this magazine.

Editorial Team

Vision

Be the preferred destination locally, regionally and internationally for the Civil Engineering society as a leading department providing high quality programs and services in civil engineering fields.

Mission

To offer outstanding U.G. & P.G. education, research guidance, professional consultancy, outreach and manpower training as well as leadership in Civil Engineering fields.

About the Department

Highlights of the Department Social Initiatives

Weather Station installed.

State of the Art Laboratories

Instrumentation Lab

Heavy Structures Lab

Simulation Lab

Life Membership

Indian Concrete Institute.

Indian Water Works Association.

Student Chapter

Indian Concrete Institute.

Laboratories

Strength of material Lab
Engineering Geology Lab
Instrumentation Lab
Environmental Engg Lab
Transportation Lab
Software Lab
Project Lab
Fluid Mechanics Lab
Survey Lab
Instrumentation Lab
Concrete / CMT Lab-I
Concrete / CMT Lab-II
Geotechnical Engg Lab
Theory of Structures Lab
Heavy Structure Lab
Simulation Lab

Major Equipments

Total Station
UTM & CTM
Pumps & Turbines
Benkingum Beam
Bituminous testing apparatus
Plate Load test apparatus
SCPT
DCPT
CBR
FFT Analyzer
Data Logger
Polaris cope
Weather Station

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Major Softwares

Staad Pro
Auto Cad
Civil 3d
Primavera P6
Primavera Contractor
Ansys
Sap 2000
Etab
GMS 6.5
Aft Impulse
Abaqus 6.12
ESR-GSR

EARTHQUAKE

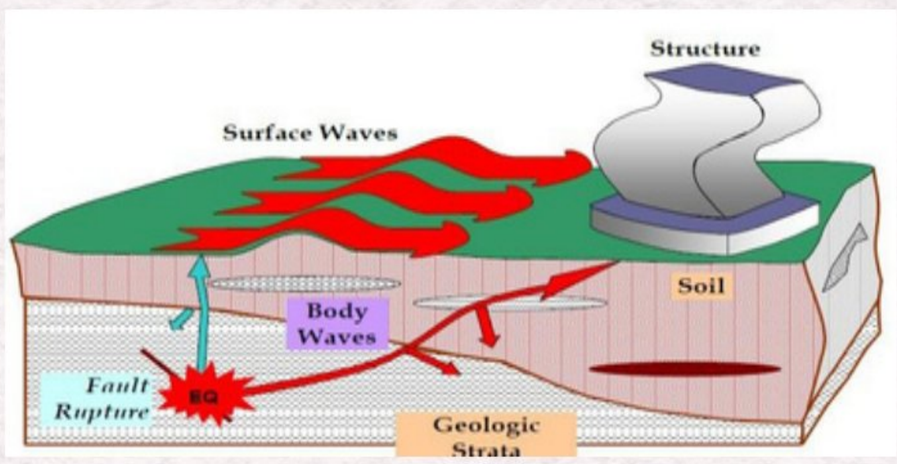
Prof. Amit Sharma
IES, IPS Academy, Indore

What is Earthquake?

A sudden violent shaking of the ground, typically causing great destruction, as a result of movements within the earth's crust or volcanic action.An earthquake (also known as a quake, tremor or temblor) is the shaking of the surface of the Earth, resulting from the sudden release of energy in the Earth's lithosphere that creates seismic waves.

Causes of Earthquake

Tectonic plates are made of elastic but brittle rocky material. And so, elastic strain energy is stored in them during the relative deformations that occur due to the gigantic tectonic plate actions taking place in the Earth. But, when the rocky material along the interface of the plates in the Earth‘s Crust reaches its strength, it fractures and a sudden movement takes place there; the interface between the plates where the movement has taken place (called the fault) suddenly slips and releases the large elastic strain energy stored in the rocks at the interface.The sudden slip at the fault causes the earthquake... a violent shaking of the Earth during which large elastic strain energy released spreads out in the form of seismic waves that travel through the body and along the surface of the Earth.



Murthy 2009

Safety Tips Before Earthquake

Have an earthquake readiness plan.

Consult a professional to learn how to make your home sturdier, such as bolting bookcases to wall studs, installing strong latches on cupboards, and strapping the water heater to wall studs.

Locate a place in each room of the house that you can go to in case of an earthquake. It should be a spot where nothing is likely to fall on you, like a doorframe.

Keep a supply of canned food, an up-to-date first aid kit, 3 gallons (11.4 liters) of water per person, dust masks and goggles, and a working battery-operated radio and flashlights in an accessible place.
Know how to turn off your gas and water mains.

Safety Measures During Earthquake

Drop down; take cover under a desk or table and hold on.
Stay indoors until the shaking stops and you're sure it's safe to exit.
Stay away from bookcases or furniture that can fall on you.
Stay away from windows. In a high-rise building, expect the fire alarms and sprinklers to go off during a quake.
If you are in bed, hold on and stay there, protecting your head with a pillow.
If you are outdoors, find a clear spot away from buildings, trees, and power lines. Drop to the ground.
If you are in a car, slow down and drive to a clear place. Stay in the car until the shaking stops.
Shut off gas valves and unplug electrical cords. If a fire breaks out, calmly begin to put it out. Secure escape routes by opening doors and windows.
Do not use lifts during earthquake.

EARTHQUAKE ANALYSIS OF MULTISTOREY BUILDING USING SAP2000 AND ETABS

Vikalp Gupta

Abstract:

As the world move to the accomplishment of Performance Based Engineering philosophies in seismic design of Civil Engineering structures, new seismic design provisions require Structural Engineers to perform both static and dynamic analysis for the design of structures. While Linear Equivalent Static Analysis is performed for regular buildings up to 90m height in zone I and II, Dynamic Analysis should be performed for regular and irregular buildings in zone IV and V. Dynamic Analysis can take the form of a dynamic Time History Analysis or a linear Response Spectrum Analysis. In present study, Multi-storey buildings with 10 stories have been modeled using software packages ETABS and SAP 2000 v.15 for seismic zone II in India.

1. Introduction

Structural analysis means determination of the general shape and all the specific dimensions of a particular structure so that it will perform the function for which it is created and will safely withstand the influences which will act on it throughout its useful life. ETABS and SAP2000 provides both static and dynamic analysis for wide range of gravity, thermal and lateral loads. Dynamic analysis may include seismic response spectrum or accelerogram time history. This analysis mainly deals with the study of a rectangular shaped plan using ETABS and SAP2000. A 25m x 9m 10-storeys structure is modelled using ETABS and SAP2000. The height of each storey is taken as 3m, making total height of the structure 35.5m. Loads considered are taken in accordance with the IS-875(Part1, Part2), IS-1893(2002) code and combinations are acc. to IS-1893(2002). Post analysis of the structure, maximum shear forces, bending moments, and maximum storey displacement are computed and then compared for all the analysed cases.

2. Objective

Study of results obtained after analysis.
To make estimation of column reinforcement.
Setting of structural plan on the architectural drawing.
To determine implemented loads in building using different IS codes.

3. Problem Definition

Salient features:

Utility of building : Residential complex No

of stories : G+10

Type of construction : R.C.C fram structure

Types of walls : Brick wall

Geometric details:

Ground floor : 3m

Plan Area : 25m x 9m

Height of plinth : 0.6m

Depth of foundation : 2.5m

Materials:

Concrete grade : M25

All steel grades : Fe415 grade Bearing

capacity of soil : 200kN/m2

DESIGN OF G+10 RESIDENTIAL BUILDING

Loading Consideration

Loads acting on the structure are dead load

(DL), Live Load (IL) and Earthquake Load

(EL) DL: Self weight of the structure, Floor load and Wall loads.

LL: Live load-
2 kN/m2 and 3 kN/m2 is considered as per IS code.

Seismic: Zone: II

Zone Factor: 0.16

Soil type: II

Response reduction factor: R=5

Importance factor: 1

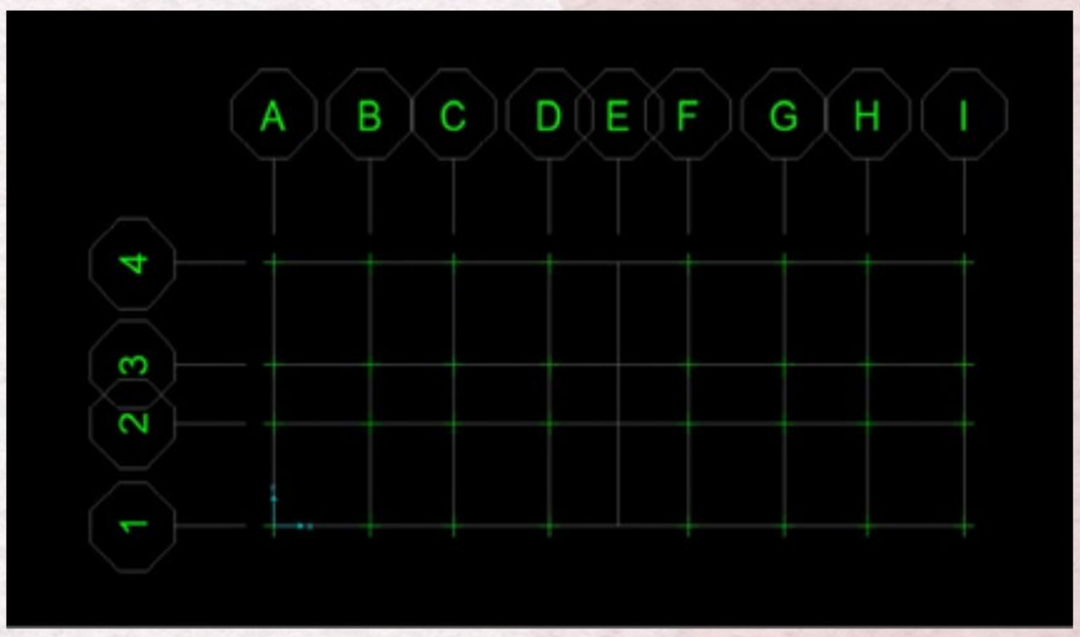
Time period: 1.04 sec (calculated as per IS 1893: 2002)

PLANNING

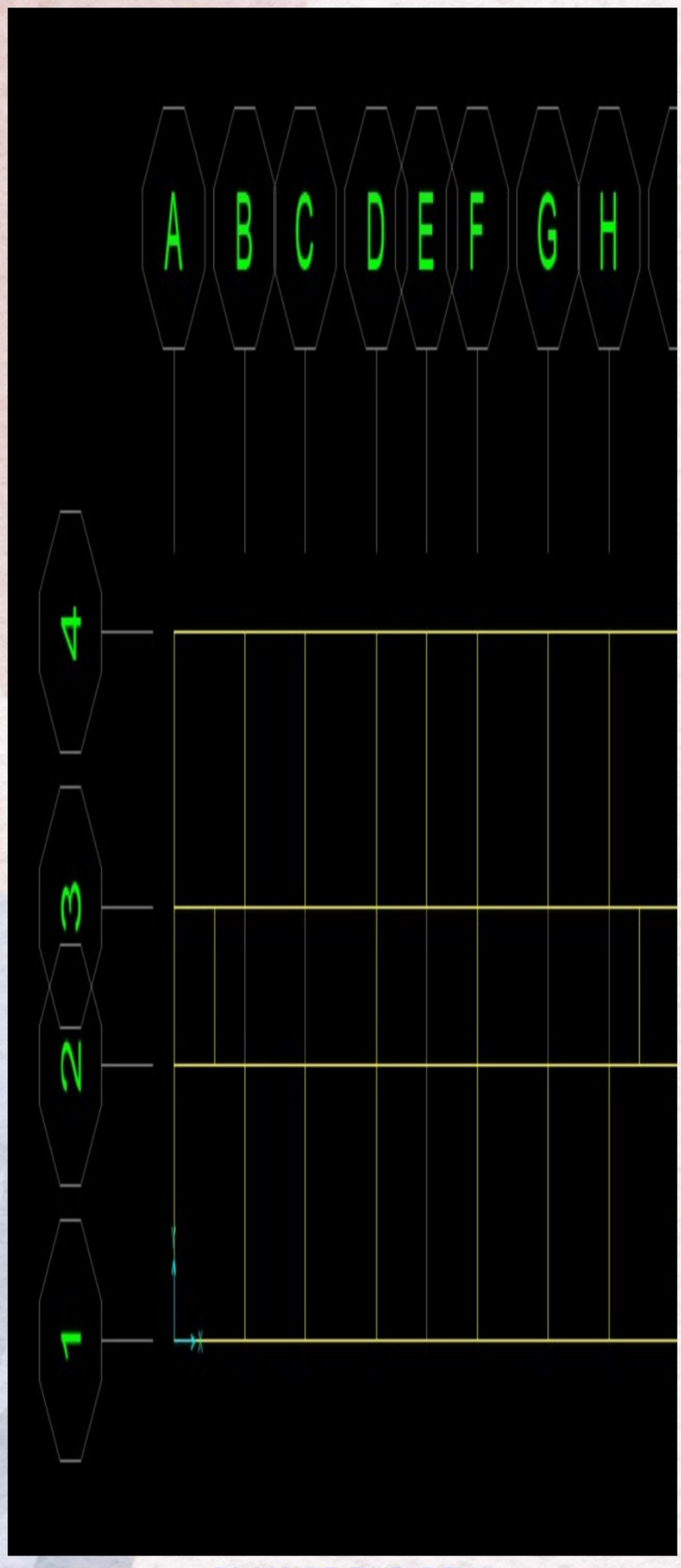
The auto cad plotting represents the plan of a ground floor building. The plan clearly shows that it is a combination of different utilities.It is a G+10 building.The plan shows the details of dimensions of each and every room and the type of room and orientation of the different rooms like bed room, bathroom, kitchen, hall etc..

The entire plan area is about 225 sq.m.

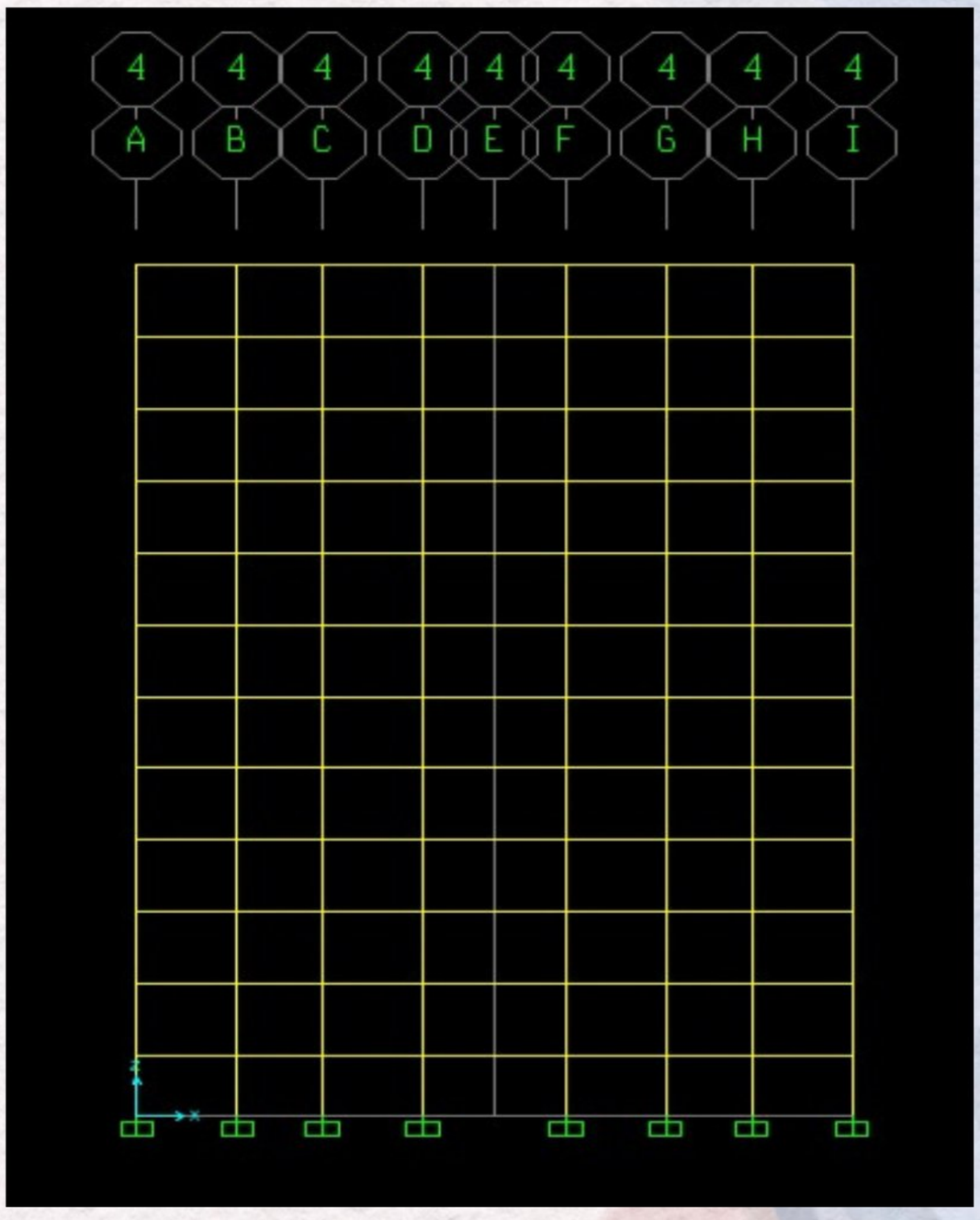
The plan also gives the details of location of stair cases.



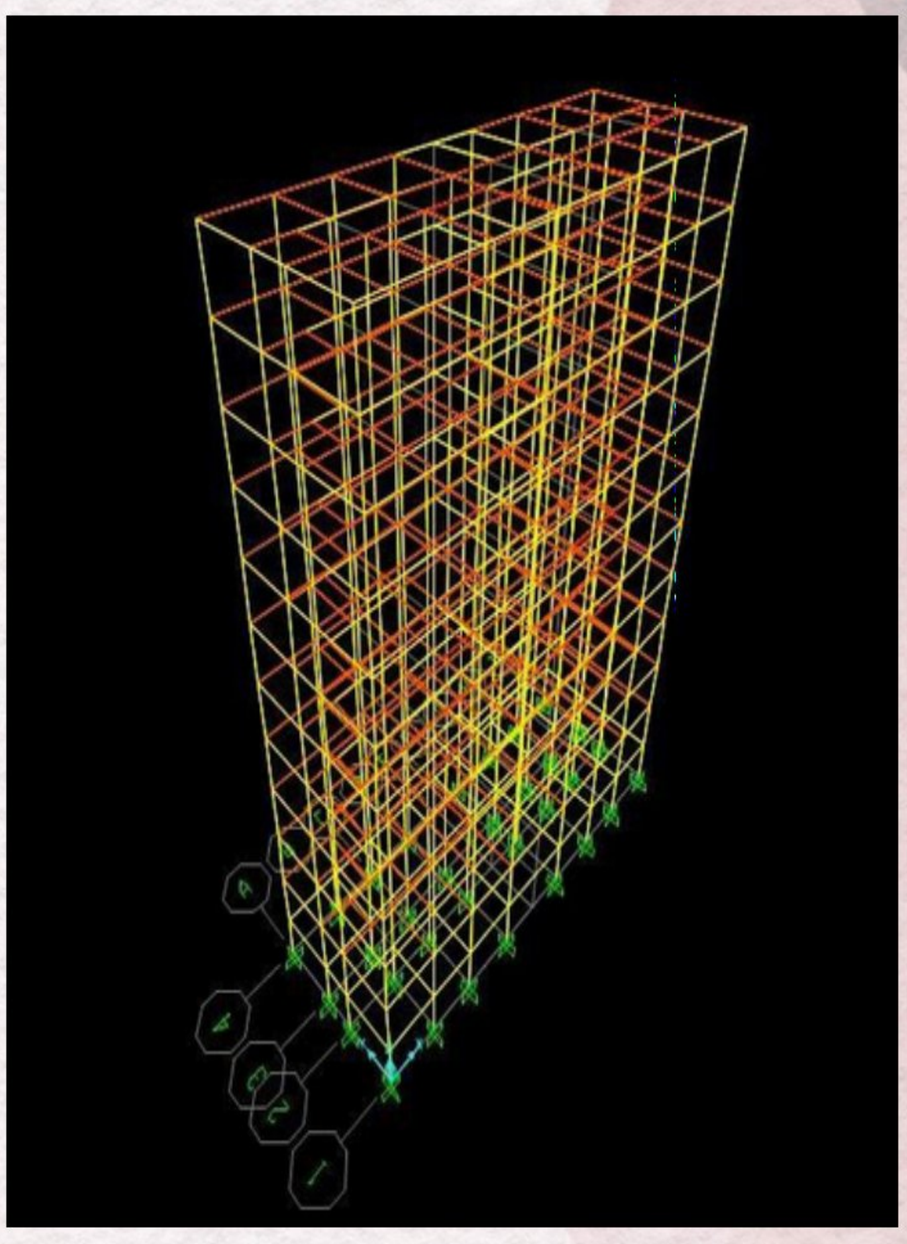
FOUNDATION LEVEL OF BUILDING



PLAN OF BUILDING



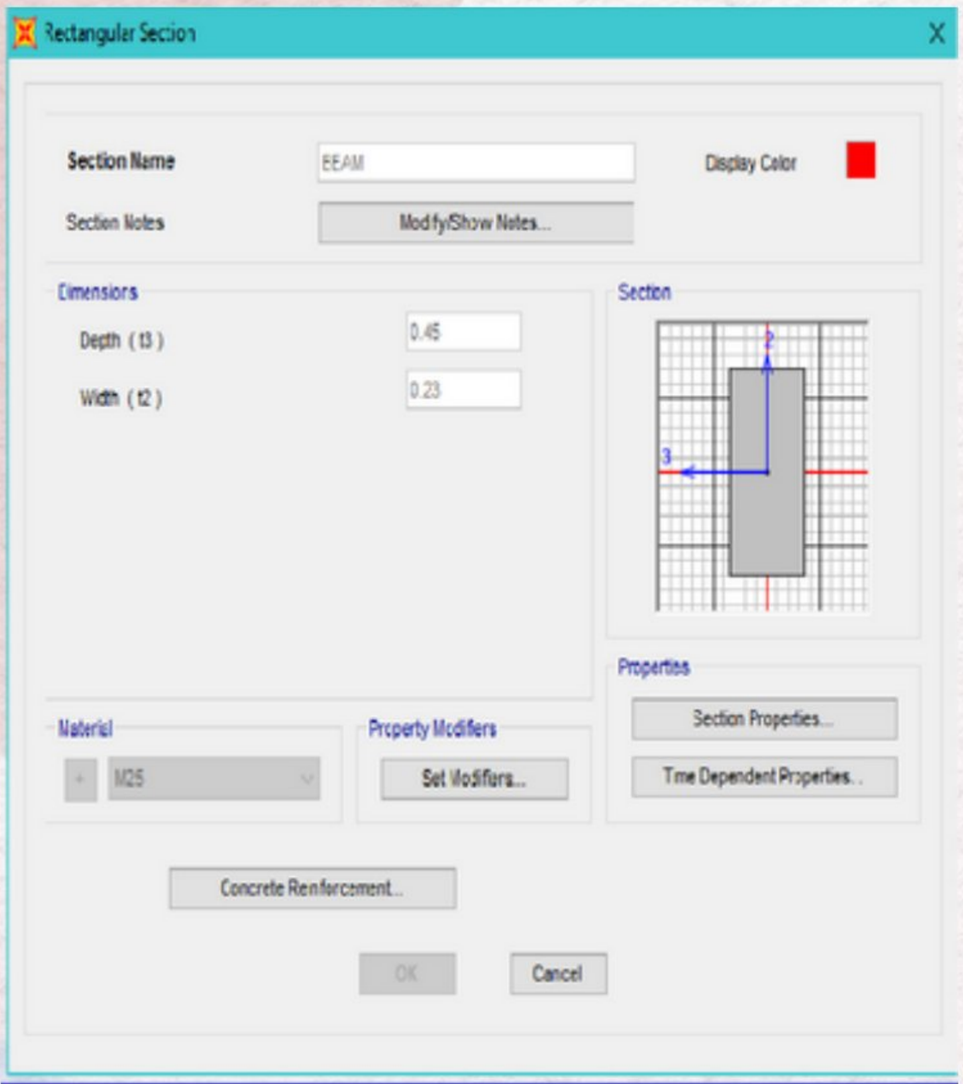
ELEVATION OF BUILDING



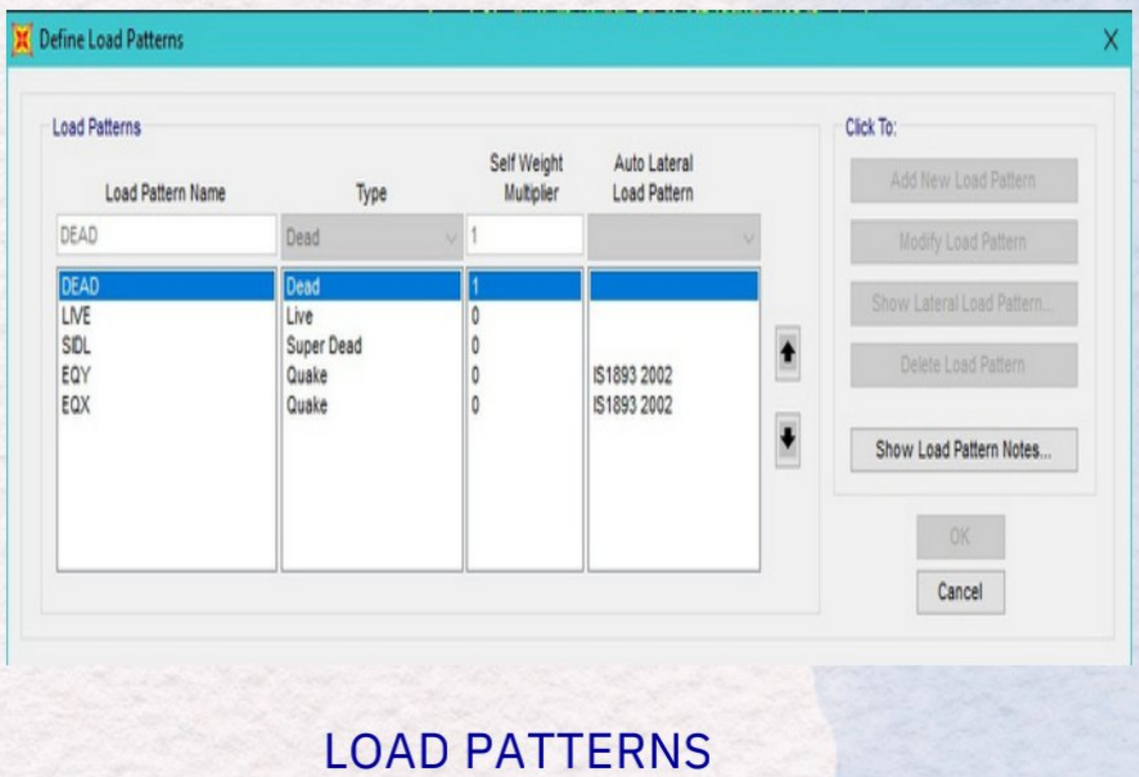
3 DIMENTIONAL VIEW OF BUILDING

ONE OF THE COLUMN PROPERTIES WINDOW

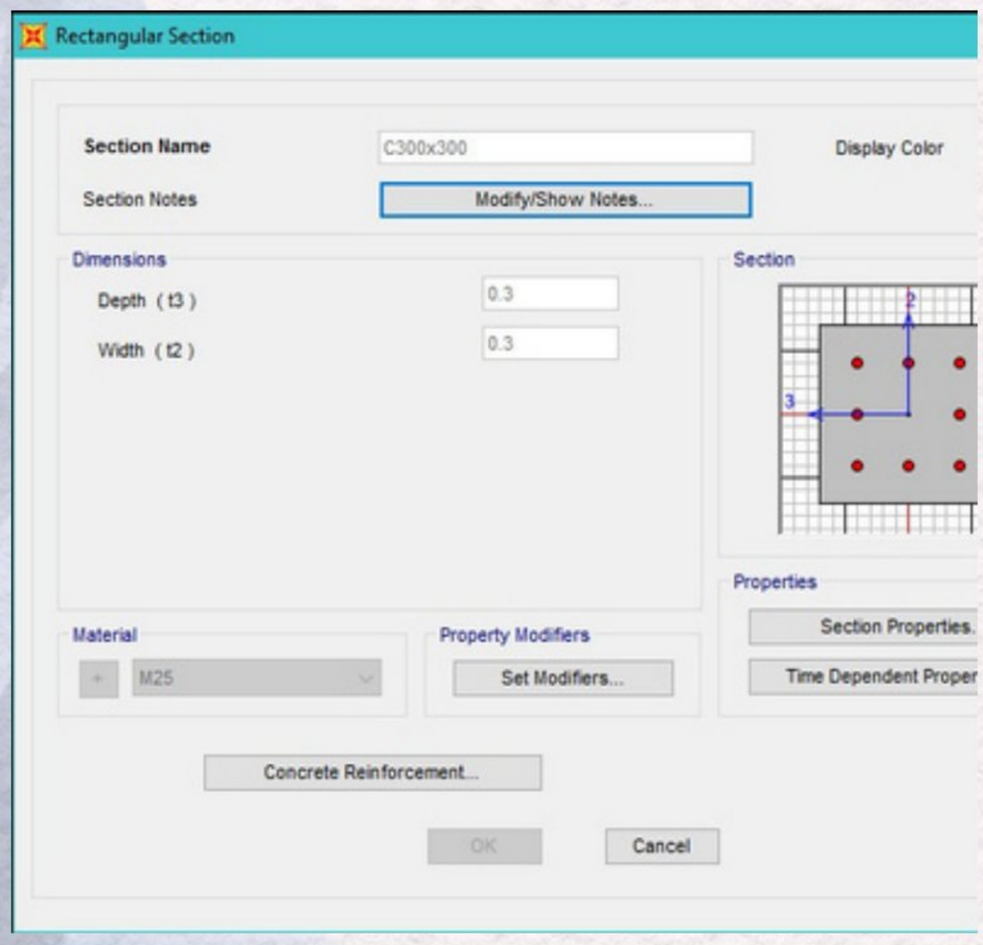
PROPERTIES DEFINED

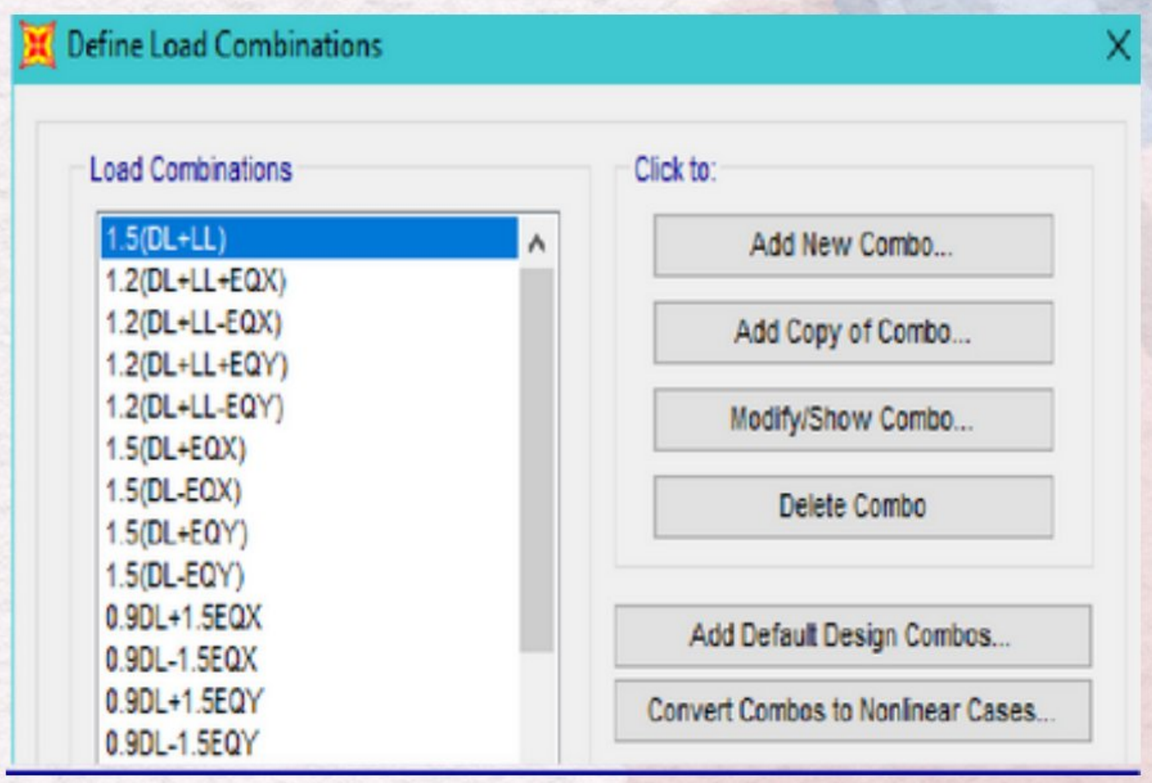


BEAM SECTION PROPERTIES



LOAD PATTERNS

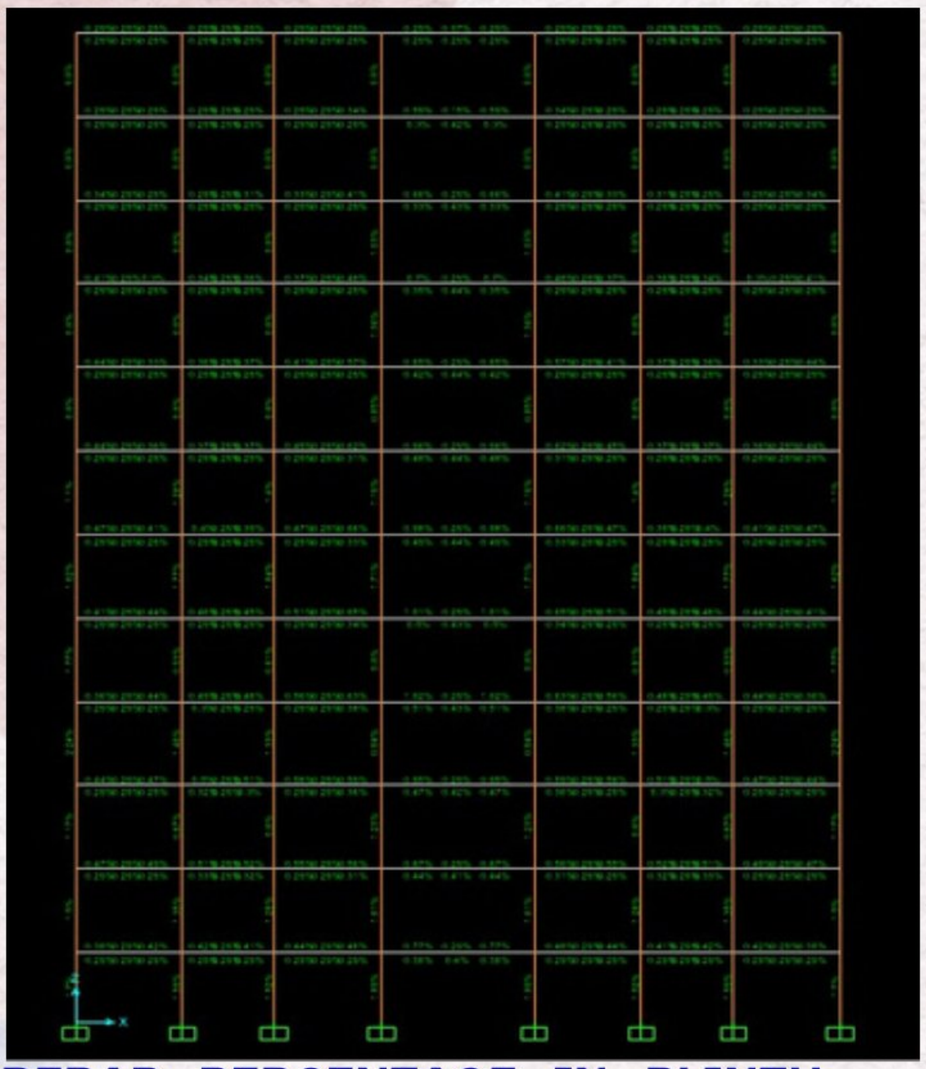




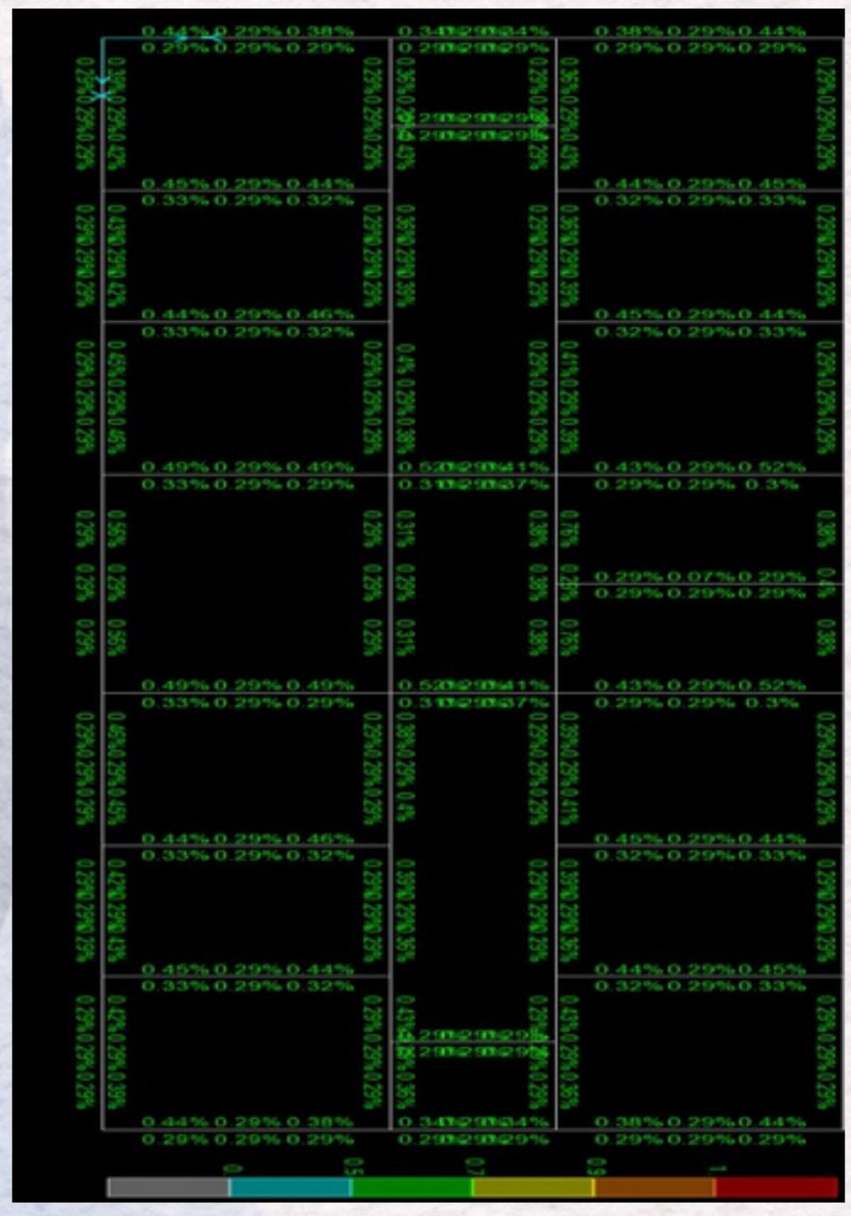
LOAD COMBINATIONS

RESULTS

REBAR PERCENTAGE IN COLUMNS

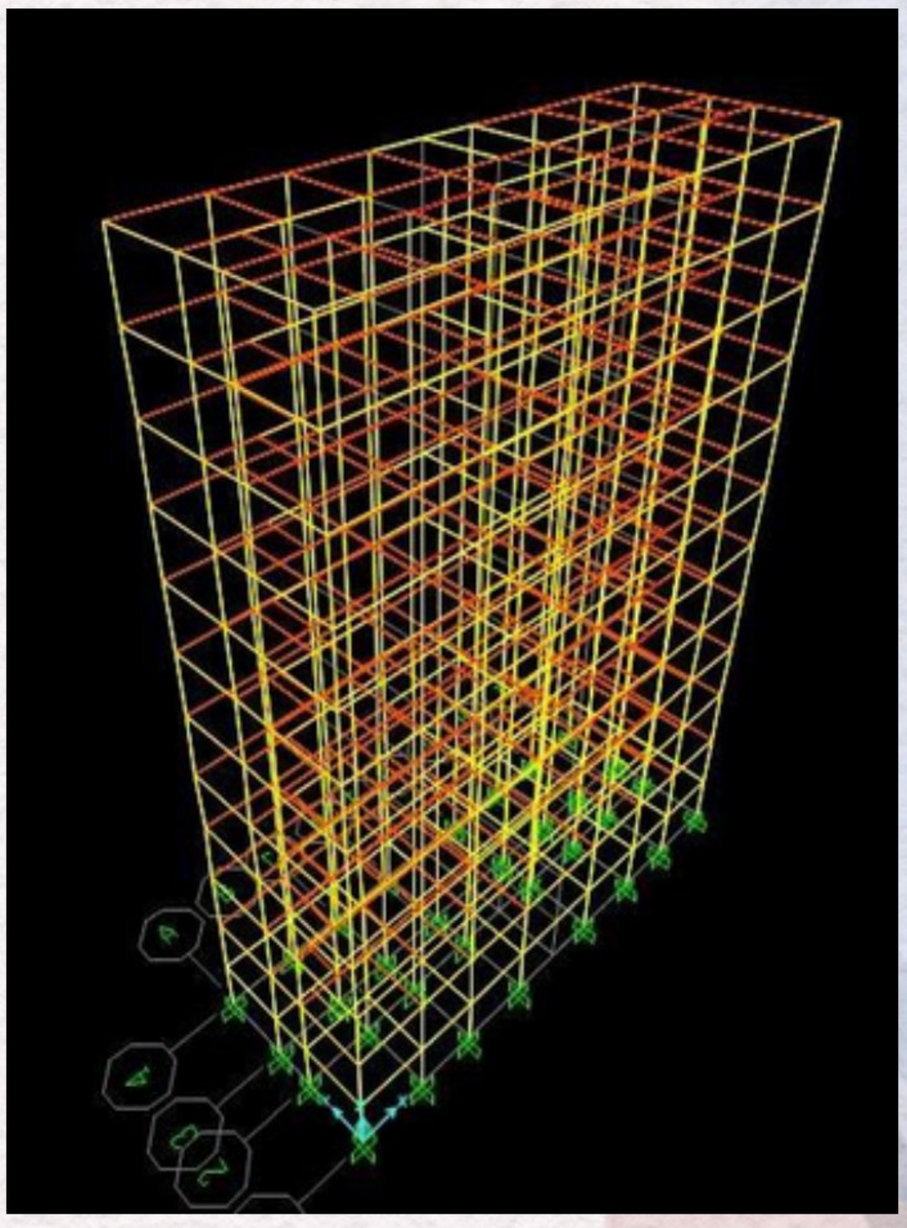


REBAR PERCENTAGE IN PLINTH BEAMS

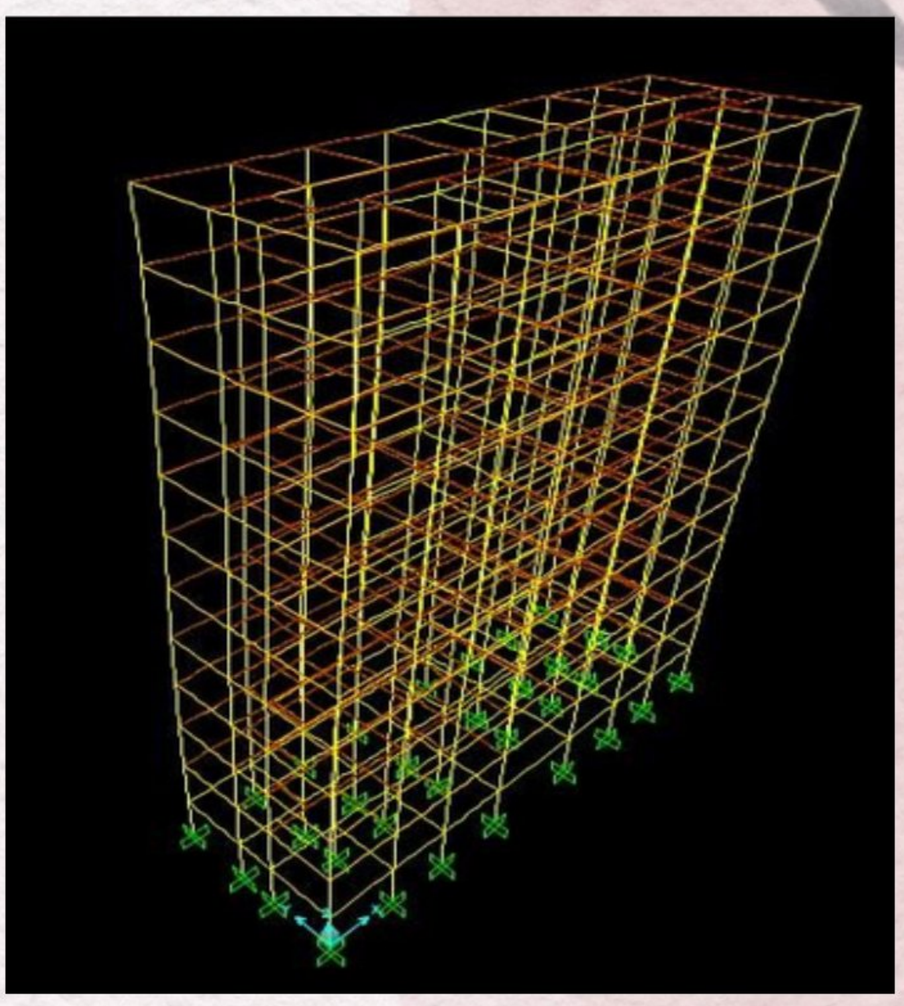


SHAPE

A) UNDEFORMED-



B) DEFORMED-



CONCLUSION

From the data revealed by the software analysis for the structures using various loading combinations following conclusions are drawn:

1. Seismic analysis was done by using SAP2000 and ETABS software and successfully checked using static check.
2. There is a gradual increase in the value of lateral forces from bottom floor to top floor in both software analyses.
3. Results as compared for 10-story building.

Base isolation system to improve earthquake resistance of structure

Adarsh Jain

Abstract:
This paper presents on base isolation system to improve resistance of building against earthquake. In the present study. Base isolation (BI) system for buildings is introduced to decouple the building structure from potentially damaging induced by earthquake motion, preventing the building superstructures from absorbing the
earthquake energy. The mechanism of the
base isolator increases the natural period of
the overall structure, and decreases its acceleration response to earthquake / seismic motion. The results obtained are discussed and compared with the available
literature

Keywords:

Base isolation, Damping, Flexible pads, Isolator, Bearing

Introduction

The concept of base isolation is now

broadly
accepted in earthquake-prone region of the
world for helpful important structures

from
strong ground motion. There are two basic
different approaches to ensure the earthquake resistance design and construction of structures,

Conventional earthquake resistant

design
approach.

Seismic isolation earthquake resistant design approach.

Conventionally, seismic design of

building
structures is based on the concept of increasing the resistance capacity of the structures against earthquakes by employing, for example, the use of shear walls, braced frames, or moment-resistant
frames. However, these traditional

methods
often result in high floor accelerations or large inter-story drifts for buildings.

Because
of this, the building contents and non-structural components may suffer

significant
damage during a major earthquake. For buildings whose contents are more

costly
and valuable than the buildings themselves,
such as hospitals, police and fire

stations and
telecommunication centres etc. Therefore,
special technique to minimize inter-story drifts and floor accelerations, Seismic isolation earthquake resistant design is increasingly being adopted. Base isolation is
to prevent the superstructure of the

building
from absorbing the earthquake energy. Therefore, the superstructure must be supported on base isolators to

performance level in the expected earthquakes.

Objective

1The concept of base isolation is now broadly accepted in earthquake-prone region of the world for to help important structures from strong ground motion.

2. Base isolation is to prevent the superstructure of the building from absorbing the earthquake energy. Therefore, the superstructure must be supported on base isolators to uncouple the ground motion.

3. The other purpose of an isolation system is to provide an additional means of energy dissipation, thereby reducing the transmitted acceleration into the superstructure.

4. The decoupling allows the building to behave more flexibly which improves its response to an earthquake.

5. Base isolation system observes and deflects the energy released from earthquake before it is transferred to the structure.

Based on above mechanism & combination the main objectives of this study are:

1) To increase strength & durability of building against earthquake

2) Reduce damage by using base

isolation

system.

Methodolgy

1 .The requirement for installation of a base isolation system is that the building be able to move horizontally relative to the ground, usually at least 100 mm.

2. The most common configuration is to install a diaphragm immediately above the isolators.

3. If the building has a basement then

the

options are to install the isolators at the top,

bottom or mid-height of the basements columns and walls.

A. Materials Specification Rubber: Neoprene

Lead: Plastic property

Steel: HYSD

B. Characteristic of Material

Rubber - Neoprene is fire resistant Neoprene's burn point is around 260°C (500°F). Because of its tolerance of extreme conditions, neoprene is useful

Lead - . During an earthquake, the kinetic energy of the earthquake is absorbed into heat energy as the lead is

deformed.

Steel - Using layers of steel with the rubber means the bearing can move in a horizontal direction but is stiff in a vertical direction.

Results Interpretation

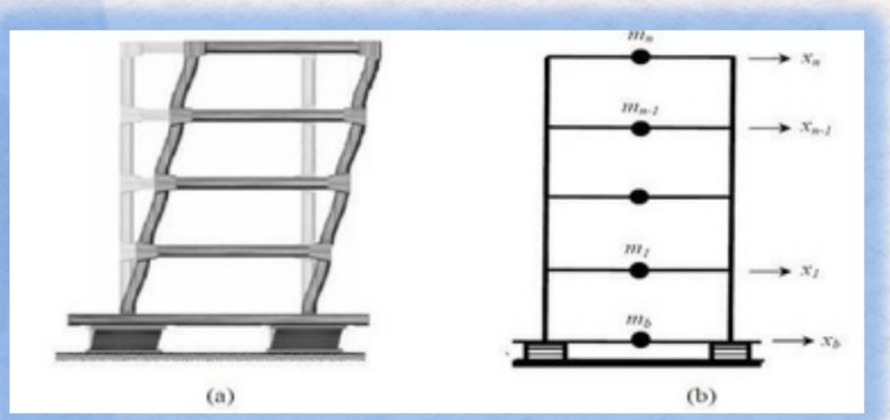
In this research we show Buildings are places of dwelling and work. Buildings occupy people and for a good duration of time. The destruction of buildings in an earthquake can result in both heavy causalities and economic damage, which is

evident from previous such catastrophic events.

. In this section, we analyse simple building in 2D plane as shear type building model subjected to understand its dynamic responses when subjected to earthquake excitation. The superstructure is considered to remain within the elastic state during the period of seismic excitation. This assumption is considered appropriate because the base isolation attempts to reduce the earthquake response keeping it within the elastic state.

The floors are assumed to be rigid in its plane, and the mass is assumed to be lumped at each floor level.

The columns are inextensible and weightless, providing lateral stiffness, which governs superstructure time period of the structure.



Building model (a) Assumed deformed shape (b) Lumped Base model

Conclusions

This research concludes the study on the
base isolation system for the resistance of
building against base isolation.

Increasing ductility of the building or increasing the elastic strength of the structure is the most conventional method of handling seismic demand.

The inertial forces caused due to earthquake is directly proportional to the mass of structure and the ground acceleration.

Base isolation provides an alternative to the conventional fixed base design of structures.

Base isolation takes an opposite approach, i.e. to reduce the seismic demand instead of increasing the capacity.

Base isolation had the effect of reducing the earthquake force demands on the superstructure to 30% of the demands for a fixed base structure.

Base isolation minimizes the need for strengthening measures of adding shear wall, frames, and bracing by reducing the earthquake forces imparted to the building.

Pervious Concrete

Hasan Rassi Wala , Aditya Gupta

Abstract:

Pervious concrete (no-fines concrete) is a concrete containing little or no fine aggregate; it consists of coarse aggregate and cement paste. It seems pervious concrete would be a natural choice for use in structural applications in this age of _green building‘. It consumes less raw material than normal concrete (no sand), it provides superior insulation values when used in walls, and through the direct drainage of rainwater, it helps recharge groundwater in pavement applications. The first pervious concrete has been used in Europe and the United Kingdom since 1930s for the building of single story and multistory houses, but had found little acceptance in rest of the world. In recent years, however, due to increased awareness of the need for conservation of nonrenewable mineral resources, increased consideration is being given to the use of pervious concrete in most countries. Even though, it is not yet widely used in Sri Lanka, pervious concrete is generally used for light-duty pavement applications, such as residential streets, parking lots, driveways, sidewalks, channel lining, retaining walls and sound walls. This paper discuss the art of pervious concrete; materials and possible mix proportions, properties such as compressive strength, flexural strength, shrinkage, permeability with initial tests done at Innovation & Application Center of Holcim (Lanka) Limited, and the principal advantages, major disadvantages and principal applications in Sri Lankan construction industry.

Keywords:

Pervious concrete, no-fines concrete, Porous concrete, permeable concrete, green concrete, sustainable concrete

Introduction

Pervious concrete is one of the leading materials used by the concrete industry as GREEN industry practices for providing pollution control, storm water management and sustainable design. The increased interest in pervious concrete is due to those benefits in storm water management sustainable development. This paper will provide technical information on application, mixture design and construction methods of pervious concrete. It will also discuss the suitability of pervious concrete in tropical countries like Sri Lanka while analysis environmental and economical benefit

What is pervious Concrete?.

Pervious concrete is a zero-slump, open-graded material consisting of hydraulic cement, coarse aggregate, admixtures and water. In the absent of fine aggregates, pervious concrete has connected pores size range from 2 to 8 mm, and the void content usually ranges from 15% to 25% with compressive strength of 2.8MPa to 28MPa (however strength of 2.8 to 10 MPa are common). The draining rate of pervious concrete pavement will vary with aggregate size and density of the mixture, but will

generally fall within the range of 81 to 730 L/Min/m2.

Pervious concrete pavement is unique and effective means to address important environmental issues and support green, sustainable growth. By capturing storm water and allowing it to seep into the ground due to its design properties, pervious concrete is instrumental in recharging ground water, reducing storm water runoff. In other words we call it as a —RAIN WATER HARVESTING CONCRETE||. This pavement technology is helpful in creating more efficient land use by eliminating the need of water retention bodies, costly storm water drainage and repair cost, which otherwise would have been incurred due to water accumulation. In doing so, pervious concrete has the potential to lower overall project costs thus making it more economical

MATERIALS USED IN PERVIOUS CONCRETE:

Benefits of pervious concrete

a) Environmental benefits

·Helps in saving precious water which otherwise goes to drains.
·Helps in keeping earth below wetter, greener and cooler.
·Recharging ground water level.
·Replace costly water harvesting systems.
· Eliminates use of asphalt which normally
causes environmental pollution.
·Use of fly ash thus reducing pollution.

b) Other benefits

·Eliminates the need of costly water drainage systems.
·Rough texture thus avoiding skidding of vehicles.
·Low maintenance cost.
·Stronger and durable for light traffic loads. ·Use of local building material.
·Lower cost compare to other pavement solution.
·Conventional construction practices.
·Use local semi skilled mason or labor.

BUILDING MATERIALS FOR PERVIOUS CONCRETE:

The basic advantage with this type of concrete is the use of locally available building material like course aggregate, fine aggregate, cement, chemical admixtures etc. Details of building materials used are as tabulated below refer table 1,2 and 3.

Table 1. 20 mm aggregates properties: Crushing value 20%, specific gravity 2.75 (other parameters confirming to IS 383 - 1970)

IS Cumulative Cumulative

Sieve Size	% Retained	% Passing
20	1	99
16.0	55.85	44.15
12.5	98.25	1.75
10	100	0
6.3	0	0

Table 2. Sand properties (specific gravity 2.52 and other parameters confirming to IS 383 - 1970)

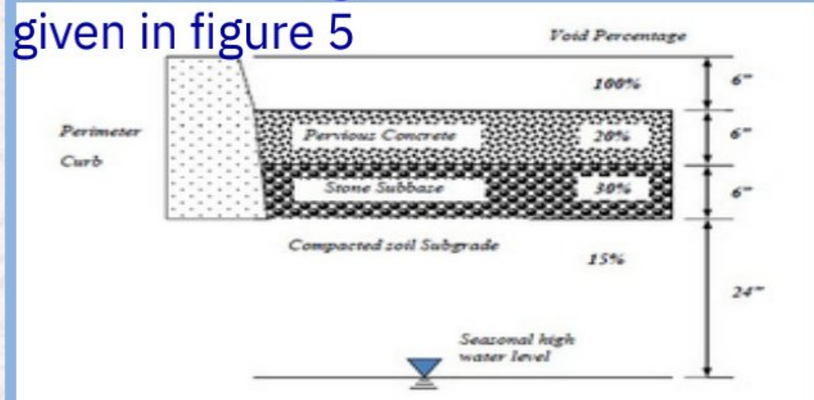
In many countries it is also termed as no fines concrete but looking to possibilities of aggregate failure we have used fine aggregate, 5% of Coarse Aggregate quantity. With 5% fine we have conducted 5 trials but got less strength compared to 0% Fine

Sieve Analysis of Fine Aggregate:- IS

Sieve Size	Cumulative % Retained	Cumulative % Passing
4.75	11.5	88.5
2.36	30.5	69.5
1.18	56	44
600 mcr	82.4	17.6
300 mcr	95.9	4.1
150 mcr	99	1
Pan	100	0

Design Pervious Concrete to control storm water

Typical cross section of pervious concrete designed for storm water is given in figure 5



Curb area: provide to retain flood water, usually 6|| layer (100% voids) Pervious concrete: usually 6|| layer (20% voids) Base or subbase: Compacted metal (stone), usually 6|| layer (30% voids) Subgrade: Compacted existing soil, usually 24|| (15% void)

RESULTS

7DAYS RESULT FOR PERVIOUS CONCRETE

CEMENT (Kg/m^3)	AGGREGATE	W/C	COMPRESSIVE STRENGTH	VOID RATIO (%)	PRACTICAL DENSITY (Kg/m^3)	THEORETICAL DENSITY (Kg/m^3)
375	10-20MM	0.30	9.10	32.38	1710.23	2529.45
375	10-20MM	0.35	9..25	28.73	1777.18	2493.70
375	10-20MM	0.40	9.96	25.27	1837.92	2459.60
375	6-10 MM	0.30	9.30	38.84	1546.96	2529.45
375	6-10 MM	0.35	10.43	33.31	1662.81	2493.70
375	6-10 MM	0.40	12.27	30.41	1718.22	2459.60
375	6-10-20 MM	0.30	10.07	38.92	1544.88	2529.45
375	6-10-20 MM	0.35	12.32	35.10	1618.37	2493.71
375	6-10-20 MM	0.40	12.84	30.75	1703.11	2459.60

28 Days results for pervious concrete

CEMENT	AGGREGATE	W/C	COMPRESSIVE STRENGTH (Mpa)	VOID RATIO (%)	DENSITY (Kg/m^3)	PERMEABILITY (mm/s)
375	20-10MM	0.30	9.33	30.23	2010.45	20.93
		0.35	10	26.65	2058.47	19.98
		0.40	10.37	24.32	2136.30	18.35
	10-6MM	0.30	9.78	31.23	2037.53	19.01
		0.35	11.41	27.45	2148.15	17.32
		0.40	12.30	25.23	2155.06	16.05
	20-10mm9(50%)+10-6mm(50%)	0.30	10.37	35.12	2100	17.95
		0.35	12.59	31.40	2163	14.72
		0.40	14.07	28.50	2240.99	12.14

CONCLUSION

problems especially at parking and walk ways. It also helps in saving precious water. Though the use of such concrete is at very

preliminary stage but is expected to increase in future looking to enormous advantages.

We used chicken mesh for achieving the tensile strength but after results we conclude that, tensile strength was better with Chain link instead of chicken mesh.
Future Scope:- Maximum tensile strength might be achieved by minimizing the spacing between the mesh we have used.

Pervious concrete "what a concrete step towards a green earth".....

Pervious concrete pavements are a very cost-effective and environmentally friendly solution to support sustainable construction. Its ability to capture storm water and recharge ground water while reducing storm water runoff enables pervious concrete to play a significant role. Pervious concrete is a smart sustainable option with very high potential. Pervious concrete is an ideal solution to control storm water, re-charging of ground water, flood control at downstream and sustainable land management. Knowledge on pervious concrete is very well received by the Specifies / Architects / Engineers.

Cataclysm

Abhinav Joshi

What is happening in our country?

Where there occurs any cataclysm. Only the casualty of people. The real casualties are of innocent children.

The catastrophe may be of any kind. Like flood, earthquake or at cataract.

Our ministers have caucus. In which they only caviled. Every time they catapult things. On each other during caucus.

At lat they blame it was people‘s fault first we should find a categorical way. i.e. catharsis of our system. Also castigate to them who don‘t come forward for help.

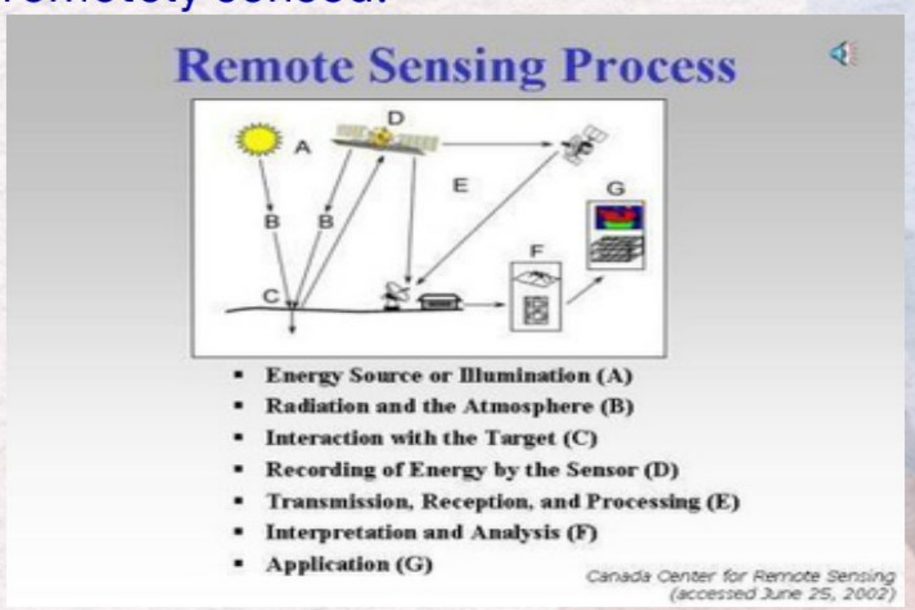
We need people like catalyst. By stopping caviling we will overcome from cataclysm.

REMOTE SENSING

Yash Goyal

It's a simple, familiar activity that we all do as a matter of daily life, but that gets complicated when we increase the scale. As you view the screen of your computer monitor, you are actively engaged in remote sensing.

A physical quantity (light) emanates from that screen, which is a source of radiation. The radiated light passes over a distance, and thus is "remote" to some extent, until it encounters and is captured by a sensor (your eyes). Each eye sends a signal to a processor (your brain) which records the data and interprets this into information. Several of the human senses gather their awareness of the external world almost entirely by perceiving a variety of signals, either emitted or reflected, actively or passively, from objects that transmit this information in waves or pulses. Thus, one hears disturbances in the atmosphere carried as sound waves, experiences sensations such as heat (either through direct contact or as radiant energy), reacts to chemical signals from food through taste and smell, is cognizant of certain material properties such as roughness through touch, and recognizes shapes, colors, and relative positions of exterior objects and classes of materials by means of seeing visible light issuing from them. In the previous sentence, all sensations that are not received through direct contact are remotely sensed.



Because the remote sensing instrumentation is not in contact with the object being observed, remote sensing allows the monitor to:

Avoid hazardous or difficult to reach regions, such as inside nuclear or chemical reactors, in biological hot spots, behind obstacles, inside smoke stacks, on the freeway, in the ocean depths, on mountain tops, on other planets, or on the sun.

•Measure a process without disturbance, such as monitoring flow around an aircraft model in a wind tunnel or measuring temperature during an experiment.

•Probe large volumes economically and quickly, such as providing global measurements of aerosols, air pollution, agriculture, human impact on the environment, ocean surface roughness, and large scale geographic features.

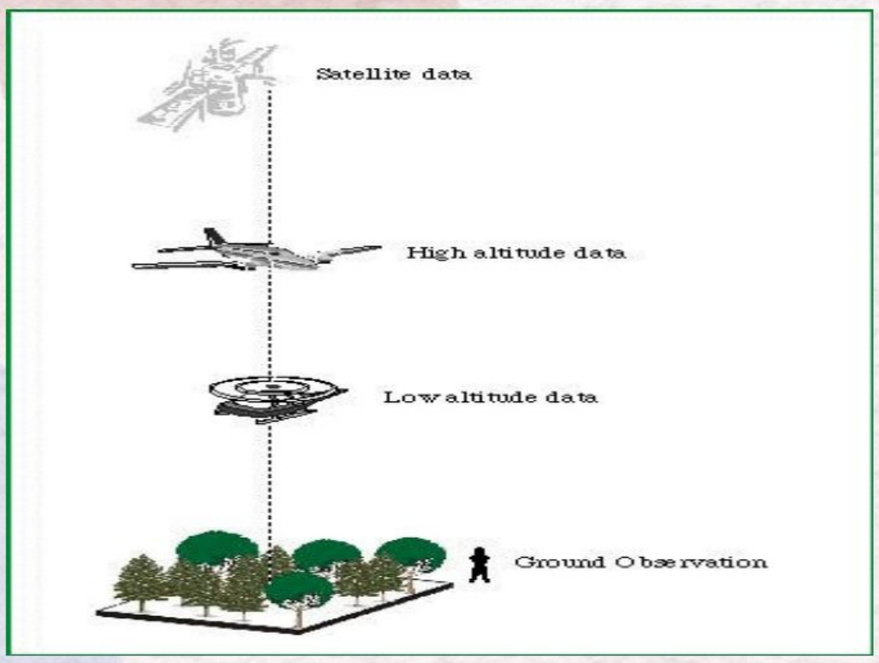


IMAGE DEVELOPMENT IN REMOTE SENSING:

Pixels and Bits:

Using radio waves, data from Earth-

orbiting

satellites are transmitted on a regular basis

to properly equipped ground stations. As

the

data are received they are translated into a

digital image that can be displayed on a

computer screen. Satellite imagery is made

up of tiny squares, each of a different

pixels—short for picture elements—and represent the relative reflected light energy recorded for that part of the image.

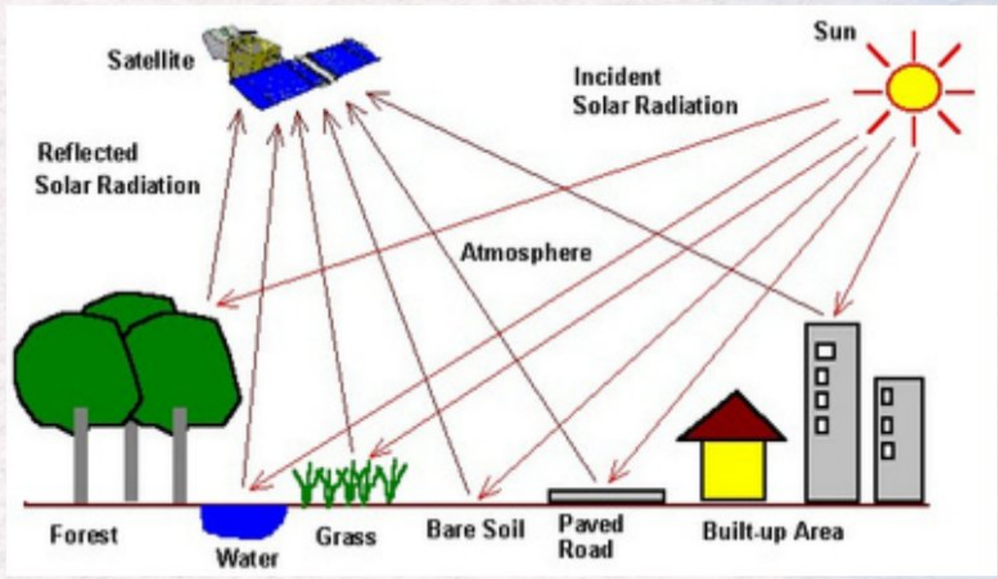
Each pixel represents a square area on an image that is a measure of the sensor's ability to resolve (see) objects of different sizes. For example, the Enhanced Thematic Mapper (ETM+) on the Landsat 7 satellite has a maximum resolution of 15 meters; therefore, each pixel represents an area 15 m x 15 m, or 225 m.

Higher resolution (smaller pixel area) means that the sensor is able to discern smaller objects. By adding up the number of pixels in an image, you can calculate the area of a scene. For example, if you count the number of green pixels in a false colour image, you can calculate the total area covered with vegetation. How does the computer know which parts of the image should be dark and which one should be bright? Computers understand the numeric language of binary numbers, which are sets of numbers consisting of 0s and 1s that act as an "on-off" switch. Converting from our decimal system to binary numbers, 00 = 0, 01 = 1, 10 = 2, 11 = 3. Note that we cannot use decimal numbers since all computers are fussy—they only like "on" and "off."

Colour Images

Another essential ingredient in remote sensing images is colour. While variations in black and white imagery can be very informative, the number of different grey tones that the eye can separate is limited to about 20 to 30 steps (out of a maximum of about 200) on a contrast scale. On the other hand, the eye can distinguish 20,000 or more colour tints, enabling small but often important variations within the target materials or classes to be discerned.

Since different bands (or wavelengths) have a different contrast, computers can be used to produce a colour image from a black and white remote sensing data set. Remember, satellites record the reflected and emitted brightness in the different parts of the spectrum, as is demonstrated in the figure above. Computer screens can display three different images using blue light, green light and red light. The combination of these three wavelengths of light will generate the colour image that our eyes can see. This is accomplished by displaying black and white satellite images corresponding to various bands in either blue, green, or red light to achieve the relative contrast between the bands. Finally, when these three colours are combined, a colour age—called a "false Colour image"—is produced.



Applications of remote sensing:

Remote sensing data are being used to map/monitor/survey/manage various natural resources of the country under National Natural Resources Management System (NNRMS) programmes. Funded by various user ministries and ISRO/DOS, these programmes have been generating valuable spatial data assets and information solutions. Several areas of application such as Agriculture, Soil, Bio-resources and Environment, Ocean Resources, Water Resources, Rural Development, Urban Development, and Disaster Management etc., which are of direct relevance to the nation are executed by ISRO/DOS centers, State Remote Sensing Centers and State/Central Agencies.

Infrared Thermography and its Applications in Civil Engineering

Himanshit Jain

Infrared Thermography is a powerful tool to investigate structural condition and equally useful for damage assessment. It is a non contact and non destructive method that enables rapid investigations. Highly efficient infrared cameras and versatile software‘s have simplified Thermography considerably over the years. While infrared Thermography has wide applications in process industries, it is not yet extensively adopted in the investigation of buildings. The paper presents a brief account of infrared thermography, the phenomenon of electromagnetic radiation, thermal imaging and applications in civil engineering.

Numerous other applications of thermal imaging are also discussed briefly along with the advantages. The recent developments in thermography and image processing have made the technique a valuable addition to the repertoire of non destructive testing methods, Thermography is not only a non contact technique but also totally non destructive technique.

The examples presented here were performed by external heating of the specimen- surface and further investigation of the cooling down process. The heating up pulse causes a in stationary heat flow, describable as propagation and attenuation of thermal waves. The propagation of the thermal wave strongly depends on the material properties like thermal conductivity, heat capacity and mass density. Due to anomalous thermal properties in homogeneities in the structural element affect the uniform heat flow and thus the surface temperature distribution. While observing the temporal changes of the surface temperature distribution with the infrared camera near surface in homogeneities will be detected. The differences between temperatures at surface positions above non-defect regions and above in homogeneities include information about defect parameters like depth, lateral size and the type of material.

History

Infrared Thermography was a chance discovery made around 1800 by Sir William Herschel, an astronomer while searching for new optical fiber materials to reduce the

brightness of sun's image in telescopes during solar observations. He was surprised to find that some of the samples of colored glass, inserted in the telescope to reduce the brightness of solar radiations, passed very little of sun's heat while some passed much heat. Herschel measured the temperature along the spectrum of light from red to violet with the help of a conventional mercury thermometer with blackened bulb. The temperature were found to increase from violet to red colors of the spectrum,
and increased to a maximum value in the
dark region well beyond the red end of the
light spectrum. He christened the
phenomenon _dark heat‘ and _invisible rays‘,
and called that segment of the
electromagnetic spectrum as _thermo
metrical spectrum‘. The term infrared was
coined much later.

However, conventional glass has limited
transparency to infrared radiation, and is not
well suited for thermal imaging.
Thermography developed further only after
1830 with the discovery by Macedonio
Melloni that naturally occurring rock salt
crustal are transparent to infrared radiations.
Rock crystals were extensively used in IRT
before the advent of synthetic crystals in the
1930‘s. Melloni developed a sensitive
device to detect heat by connecting several thermocouples in series. The first _heat picture‘, as it
was then called, was obtained
in 1840 by Sir John Herschel, the illustrious
son of the discoverer of infrared radiation.
The light reflected from the differential evaporation of a thin oil film exposed to a
heat pattern forms an image visible to naked
eye. The thermal image obtained on paper
was called _thermograph‘ by John Herschel

ideal body does not exist in reality, but the concept is useful in comprehending the concepts of thermal radiation. The radiation on a body is partly absorbed, transmitted and reflected. Similarly, the exitant radiation from the surface of a body comprises components of energy emitted, that reflected from the surface and the energy transmitted through the body by a source behind it. The component of exitant energy depends on the emissivity and reflectivity of the surface, and thermal properties of the body. Steel
elements have uniform temperatures because of high conductivity, while temperatures on a concrete element are likely to vary over its surface.

The infrared camera senses the exitant thermal energy from the body, converts into temperature and displays thermal images. While thermal images provide useful data, the exitant energy should be considered in analyzing and interpreting the thermal images. While the exact values of thermal properties are not always required to assess thermographs, the sources of radiation from the body help in correct assessment. A source of radiant thermal energy close to a body may lead to incorrect interpretation of the images.

The energy emitted by a surface is affected by the properties of the body. The changes in the quality of concrete due to local deficiencies such as poor compaction, seepage of water and deterioration, for instance, result in small changes in the surface temperature. Such images enable damage assessment of structures.

Image Processing

The infrared camera is a simple device and can be handled with usual precautions like an ordinary photographic camera. The images have to be focused and composed the same way. The focus, composition and range of temperatures chosen cannot be altered later, though brightness and contrast can be adjusted in the image to highlight the required details. It is essential to focus the camera for sharp images, compose the significant details being monitored, and set the temperature range for useful results.

The images are processed by software to yield thermal images. Various thermal patterns can be obtained by varying the palette, brightness and contrast of the image for locating details and correct interpretation of images. Various colour palettes can be selected, including grey palette. Thermal images appear as zones of different colours

or shades depending upon the temperature range and mean temperature selected.

It should be mentioned here that the visual colours do not necessarily reflect the temperature patterns. The bright regions in a thermal image indicate high temperatures, while the dark regions indicates low temperatures and the intermediate regions are marked by colors ranging from white to black through yellow, orange, red and indigo. On a grey palette, various shades ranging from white to black distinguish the regions of reducing temperatures.

Passive and Active Thermography

The exitant energy from the surface of a body depends primarily on its temperature. The quality of thermal image depends on the variation in surface temperatures; greater the contrast in temperatures, the better will be the image.

Thermal images can usually be obtained under ambient conditions. When the body is heated by ambient conditions, it implies passive thermography. Sometimes the body is heated by an external source to obtain temperature contrast. Such a process is known as active thermography. The former process is adopted while assessing large bodies, while active thermography is generally adopted in laboratory investigations.

4. APPLICATIONS

The technique has numerous applications in condition assessment of structures, locating the sources of distress, assessment of damage potential in concrete and masonry structures, identifying moisture ingress and flow through pipes. Thermal images are widely used in all branches of engineering including computer systems where it is especially used to locate components of excessive heat generations. Some of the applications with typical images are discussed here briefly.

Moisture Penetration

Presence of moisture causes lower temperature due to ambient evaporation, and consequent cooling of surfaces. Thermal images indicate the regions of temperatures distinguished by various colors or shades, depending upon the palette selected. For example, during monsoons, some of the rain water tends to penetrate the walls and ceilings and windows. With the help of a thermal camera these point of leakage can be located, with the black areas showing the water leakage points.

Plumbing

Infrared cameras also help in assessing plumbing and flow through pipes. For instance, water stored in an overhead tank tends to get heated up during the day. The infrared camera tends to utilize this heat of water to form an image. The while travelling through the pipes, inside the walls, appears white in the thermograph, while the walls tend to appear relatively darker, as these are at room temperature.

Concrete Structures

Thermal images determine the state of fresh as well as hardened concrete. The uniform color of the rotating drum during mixing indicates the homogenous mixing of concrete. It also helps in determining the flow pattern through the pipes. Any obstruction to the flow can be observed from the temperature pattern of the thermal image. The effectiveness of the curing procedure adopted can also be assessed by this process.

Tension Test on Reinforcement Bars

Reinforcement bars tested for their tensile strength fail at a section after necking. However, tensile tests do not reveal the yield point precisely, or the critical section until after failure. The temperature of the bar increases with load and generally the temperature rise is uniform along the bar length in the elastic region. During the post elastic loading, the temperature starts increasing locally, in the region of failure. Thermal imaging can be useful in determining the yield point more accurately than by conventional strain measurement. Also during the bend test of a bar, the region under tension is seen at a higher temperature than the region under compression.

5. DISCUSSION

Infrared thermography is a non-destructive and non-contact tasting method. All other NDT methods require access to the test element, and surface treatment. Some of them may at best be termed as semi-destructive rather than non-destructive. In any case, all the methods, including the advanced techniques, such as ground penetrating radar and impulse echo, require direct access contact with the structural element.

Thermography does not need any access and generally no surface treatment and it does not obstruct construction or restrict the use of the structure during investigation. The device is simple to handle, and can monitor large areas in a short time.

How to identify RC Structure elements visually in a building

Ayushi Chawla

When you are in a building, what do you see? It can be important when you want to renovate your building

Common RC structure elements are beams, columns and slabs. When you are in a building, what do you see? You see some walls, windows and doors. It can be important when you want to renovate your building. You cannot simply hack off the mentioned elements, unless you have a structural engineer who has studied your building structure as it will affect the structural integrity of building structure. The engineer will recommend some remedial proposals.

Some common RC structure elements are:

1. Beams- horizontal members carrying lateral loads.
2. Slabs- horizontal plate elements carrying
3. Columns- vertical members carrying primarily axial load but generally subjected to axial load and moment.

Below are some tips to visually identified RC structure elements.

Bear in mind that the locations described below are possible places of appearance of elements and are not 100% correct. Single

storey Car porch location. Normally the car porch location is open area but some car porches have walls. For open area, all the vertical elements are RC columns, whereas all the horizontal members that carry the roof trusses is RC beams. Internal building RC columns are mainly located at the corners and end of walls. Any vertical location is open area but some car porches have walls. For open area, all the vertical elements are RC columns, whereas all the horizontal members that carry the roof trusses is RC beam , RC columns are mainly located at the corners and end of walls.

Any

l member in a building is RC column. When you see an element protrude out from a flat

wall, those particular elements is possibly a

RC column RC beams hide above the walls and is horizontal rectangular members that appear on ceiling. RC slabs will be the horizontal element at ceiling level that you can see. Sometimes, it may be plaster ceiling

not slab. When you knock on the RC elements, you will feel it is a solid member.

Alternative Concrete for Dams

Pranjal Jain

GERCC was used to produce an inexpensive, aesthetically pleasing finish for the non-overflow portions of the downstream face of the 188-foot-high Hickory Log Creek Dam in Canton, Ga.

-

Roller Compacted Concrete (RCC)

RCC is frequently used for the construction of mid-sized to large mass concrete applications, including dams, because of its faster placement rate, lower heat of hydration, and reduced cost compared with conventional concrete. RCC is a no-slump concrete that is typically spread in lifts as thick as 12 inches with earthmoving equipment and compacted with a smooth vibratory roller. Early experience on RCC dam applications in the 1980s showed a tendency for seepage to develop along the 1-foot-thick lift lines due to the tendency at the time to use a lean RCC mix. Therefore, many RCC dam designers started including an upstream facing system as a watertight barrier in combination with careful attention to lift joint preparation and treatment. The upstream barrier is typically constructed of a zone of conventional concrete, an exposed liner system, or precast concrete panels with or without a liner system. An alternative facing material that has been used extensively overseas and is starting to gain more widespread acceptance in the United States is Grout Enriched RCC (GERCC). This innovative process includes addition of a neat cement grout to the uncompact RCC at each lift along the upstream face. After the grout has soaked into the RCC, immersion vibrators are used to mix and to consolidate the grout and RCC to produce a seamless zone similar to conventional concrete. The surface of the RCC lift is then compacted with a vibratory roller. This process is typically used with higher-paste RCC mixes with cementitious contents (cement plus Class F fly ash) of 300 pounds
or more per cubic yard and has a Vebe time less than 20 seconds. The grout simply consists of a mixture of Portland cement and water with a 1:1 ratio by weight. The water-cement ratio of the grout may be reduced with the use of a water-reducing admixture to approximately 0.7:1.0 to improve the strength and durability of the GERCC facing. The GERCC facing is typically applied to produce a facing with thickness between 12 and 24 inches. Laboratory tests
have shown that the grout may not evenly disperse throughout the RCC by using

immersion vibrators. However, the basic intent for using GERCC is to ensure that enough paste is made available to fill any voids in the RCC that is placed against formwork and foundation contacts. Unless the parent RCC mix has an excessively low Vebe time (less than 10 seconds), compacting the RCC against formwork or rock surfaces without the additional grout results in honeycombing and therefore poor aesthetics of the finished surfaces and poor bonding to foundation surfaces. The proper application of GERCC has proven to provide conventional concrete-like surfaces and good bonding capacity. The first reported use of GERCC for an upstream facing system was on the cofferdam for Puding Dam in China in 1994.

Subsequently, GERCC was used on the 430-foot-high Jiangya Dam in Hunan Province, China, for the upstream face and to create a bond along the rock abutment interface. Placement of the 1,439,000 cubic yards RCC was successfully completed in 1999.

According to a listing of RCC Dams worldwide published in Hydropower and Dams World Atlas 2010, more than 75 dams have been completed or are currently under construction using GERCC in at least 22 countries, with 35 constructed in China alone.

Deep Creek Dam

The recently completed Deep Creek Watershed Dam 5D represents the first use of GERCC as the sole upstream barrier for a dam in the United States. This multi-purpose flood control and water supply dam in Yadkinville, N.C., was designed by Schnabel Engineering. A composite dam design was selected to make efficient use of the complex existing foundation conditions. Shallow competent bedrock on the right side of the valley was used to support a RCC gravity section with a maximum height of 74 feet and a length of approximately 750 feet. On the left side of the valley, rock was deeper and more variably weathered. A zoned earthen embankment was designed to

wrap around the end of the RCC dam and extend roughly 800 feet to the left abutment. During design, Schnabel primarily focused on three types of RCC facing including formed RCC, conventional concrete, and GERCC. Several factors were considered in the selection including constructability, permeability, durability, cost, and appearance. GERCC was selected based on its proved performance worldwide, lower anticipated cost, and expected production advantage compared with other facing alternatives. GERCC also offered flexibility along the dam/abutment and foundation interface where surfaces were expected to be irregular. Design of the proposed dam was completed in 2004; however, due to lack of funding, the project was not bid until October 2008. The project was awarded to the low bidder; Haymes Brothers Construction Inc. from Chatham, Va. ASI Constructors Inc. of Colorado was responsible for RCC and conventional concrete as a subcontractor to Haymes. The project was completed in August 2010 and includes a 16-inch-thick GERCC upstream face and a 12-inch-thick GERCC downstream face. Since initial filling, the face has performed successfully with very minimal seepage.

In the United States and its territories, since the completion of Deep Creek, GERCC has been used to produce an aesthetically pleasing downstream face for the exposed RCC overtopping protection project at Fox Creek 4 Dam in Flemingsburg, Ky., and is currently being used for the upstream and downstream facing for Portuguese Dam in Pu Rico, designed by the U.S. Army Corps of Engineers, and at the San Vicente Dam near San Diego where the existing 220-foot- high concrete dam is being raised 117 feet
with RCC .

evaluating and recording boundaries and land characteristics.

Land Surveying Techniques

The kinds of land survey technique chosen for use depend on a multiplicity of elements like the kind of survey that is being carried out. Land surveys are actually divided into three basic categories: standard land surveys used to fix property boundaries, compute

land areas etc.; engineering surveys to assure that the building is built in correct place; and informational surveys which are applied to produce maps and charts. Yet another classification of land surveying technique is either geodetic surveys or plane surveys.

The five fundamental techniques are:

The **triangulation** land survey technique applies a sequence of linked triangles that unite and extend beyond each other, and from there slants can be evaluated from fixed stations. This is the most normally used land survey technique, which is also very well-organized since it reduces the count of measuring that should be made.
An electronic distance measuring tool which helps in measuring the dimensions of the triangles is used in the **trilateration** land surveying technique. It is from these measurements of the dimensions that the angles are computed. Trilateration is an ideal land survey technique in coarse land where it can be better off to get precise calculations than by means of the customary triangulation land survey technique.
Sequences of lines whose measured distance and dimensions are linked mutually by points in fixed locations are used
in the **traverse** land survey technique.

Traverse lines are either open or closed, and they are adjustable to move about rough terrain or obstructions as necessitated. This sort of land survey technique is generally used for producing preliminary surveys to build new roads.
The elevation in a particular area can be measured with the **leveling** land survey technique. This method involves determining the measurements of perpendicular distances on a calibrated rod by means of a leveling instrument. There are several leveling instruments, nevertheless dumpy levels, theodolites, and transits are the ideal options. The variation in the elevation between two points can be calculated with the help of trigonometry. The last land surveying technique is **radiation.** By means of a fixed position
above a ground position, a variety of points
are assumed at the border of the survey
are

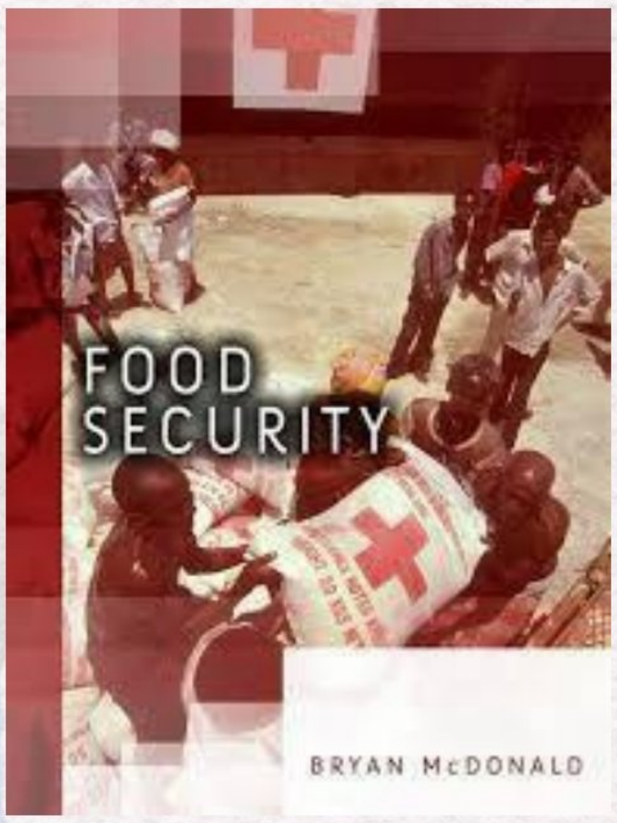
Food Security: An International Concern

Tarun Sharma

The World Food Summit of 1996 defined food security as existing —when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life‖.

Commonly, the concept of food security is defined as including both physical and economic access to food that meets people's dietary needs as well as their food preferences. In many countries, health problems related to dietary excess are an ever increasing threat, In fact, malnutrion and food borne diarrhea are become double burden.

Food security is built on three pillars:



Food availability: sufficient quantities of food available on a consistent basis.

Food access: having sufficient resources to obtain appropriate foods for a nutritious diet.

Food use: appropriate use based on knowledge of basic nutrition and care, as well as adequate water and sanitation.

Food security is a complex sustainable development issue, linked to health through malnutrition, but also to sustainable economic development, environment, and trade. There is a great deal of debate around food security with some arguing that:

There is enough food in the world to feed everyone adequately; the problem is distribution.

Future food needs can - or cannot - be met by current levels of production.

National food security is paramount - or no longer necessary because of global trade.

Globalization may - or may not - lead to the persistence of food insecurity and poverty in rural communities. Issues such as whether households get enough food, how it is distributed within the household

and whether that food fulfils the nutrition needs of all members of the household show that food security is clearly linked to health.Agriculture remains the largest employment sector in most developing countries and international agriculture agreements are crucial to a country's food security. Some critics argue that trade liberalization may reduce a country's food security by reducing agricultural employment levels. Concern about this has led a group of World Trade Organization (WTO) member states to recommend that current negotiations on agricultural agreements allow developing countries to re-evaluate and raise tariffs on key products to protect national food security and employment. They argue that WTO agreements, by pushing for the liberalization of crucial markets, are threatening the food security of whole communities. Related issues include:

What is the net impact of the further liberalization of food and agricultural trade, considering the widely differing situations in developing countries?

To what extent can domestic economic and social policies - and food, agricultural and rural development policies - offset the diverse (and possibly negative) impacts of international policies, such as those relating to international trade?

How can the overall economic gains from trade benefit those who are most likely to be suffering from food insecurity?

Do gains —trickle down|| to enhance economic access to food for the poor?How can food and agricultural production and trade be restrained from the over-exploitation of natural resources that may jeopardize domestic food security in the long term?

MAJOR PROJECTS OF STUDENTS

1.Soil Structure Interaction of Isolated Footing Using National Geotechnical Centrifuge Facility.

2. Fluid Dynamic Simulation and Modeling.

3. Glass Industry Waste-An Asset to Concrete Industry.

4. Low cost building blocks: a possible replacement of bricks.

5. Tensegrity Robot.

6. Tooth as Structural Inspiration.

7. Stabilization of Sewage Sludge Using Vermitech.

8. Analysis of flexural behavior of beam by various sensing techniques.

9. Reservoir Inflow Forecasting.

10. Structural Design of biogas plant based on kitchen waste.

11. Ground water modeling of Raipur region using G.M.S and A.N.N.

12. Green Building.

13. Multilevel parking structure.

14. Cut Throat Flume.

15. Design of flexible pavement and soil stabilisation using milled scale.

16. Inter Linking of Rivers.

17. Pipe distribution system from AFT Impulse.

18. Performance analysis & remidial study for R.C.C. structure under blast loading.

19. Experimental analytical investigation for the properties of ferrocement conc.composits.

20. Sesmic strengthening of existing residential building.

GLIMPSES OF THE PAST YEAR