2022-23

# SANDARBH


## IPS Academy

## INSTITUTE OF ENGINEERING & SCIENCE

(A UGC Autonomous Institute, Affiliated to RGPV)

*Knowledge, skills & values*

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# CONTENTS



# MESSAGE FROM THE PRINCIPAL

It is a immense gratification to see the innovative expressions of students who had contributed to Sandarbh. CED has grown generously in the recent past. It continues to sustain its growth. Students reading this E-Magazine will realize the tremendous changes that are happening in the department. The E-Magazine is presenting a glimpse of the growth of the department on many fronts. The department has been merely unstoppable in its progress as it has been actively involved in various activities that have brought to light the hidden talents of the students and staff. The highly qualified and dedicated faculty members & staff have always carried out their duties with a level of commitment. They stand as a witness to the monumental efforts taken by the management to make the department a centre of excellence in education and research. I wish the students and the department success in their future endeavors.

**Dr. Archana Keerti Chowdhary**
**Principal**

# EXPERT ARTICLE BY PROF.AMIT SHARMA

It is with immense pride and joy that I write this message for 'SANDARBH' the annual magazine of IPS Academy. This magazine serves as a canvas for our students to unleash their creative spirits, fostering originality of thought and expression among them. The diverse contents showcased in the magazine truly reflect the boundless creativity and imagination possessed by our talented students.

At IPS Academy, we believe that education is not limited to academic excellence alone. Our commitment to nurturing well-rounded individuals extends to providing a vibrant platform for co-curricular and extra-curricular activities. We firmly believe that a holistic approach to education, encompassing both academic and extracurricular pursuits, is key to fostering the overall personality development of our students.

I extend my heartfelt congratulations to the Director, esteemed faculty members, and our dedicated students who have wholeheartedly contributed to the growth and success of this institution. Their unwavering commitment, service, and sense of responsibility have played a pivotal role in transforming IPS Academy into an exceptional and renowned temple of learning.

As we celebrate the spirit of creativity and excellence through 'SANDARBH' let us continue to strive for greatness and inspire each other to achieve new heights. May this magazine be a beacon of inspiration for future generations, empowering them to contribute meaningfully to society.

Wishing everyone involved in this endeavor continued success and prosperity.

**PROF.AMIT SHARMA**

# EDITORIAL

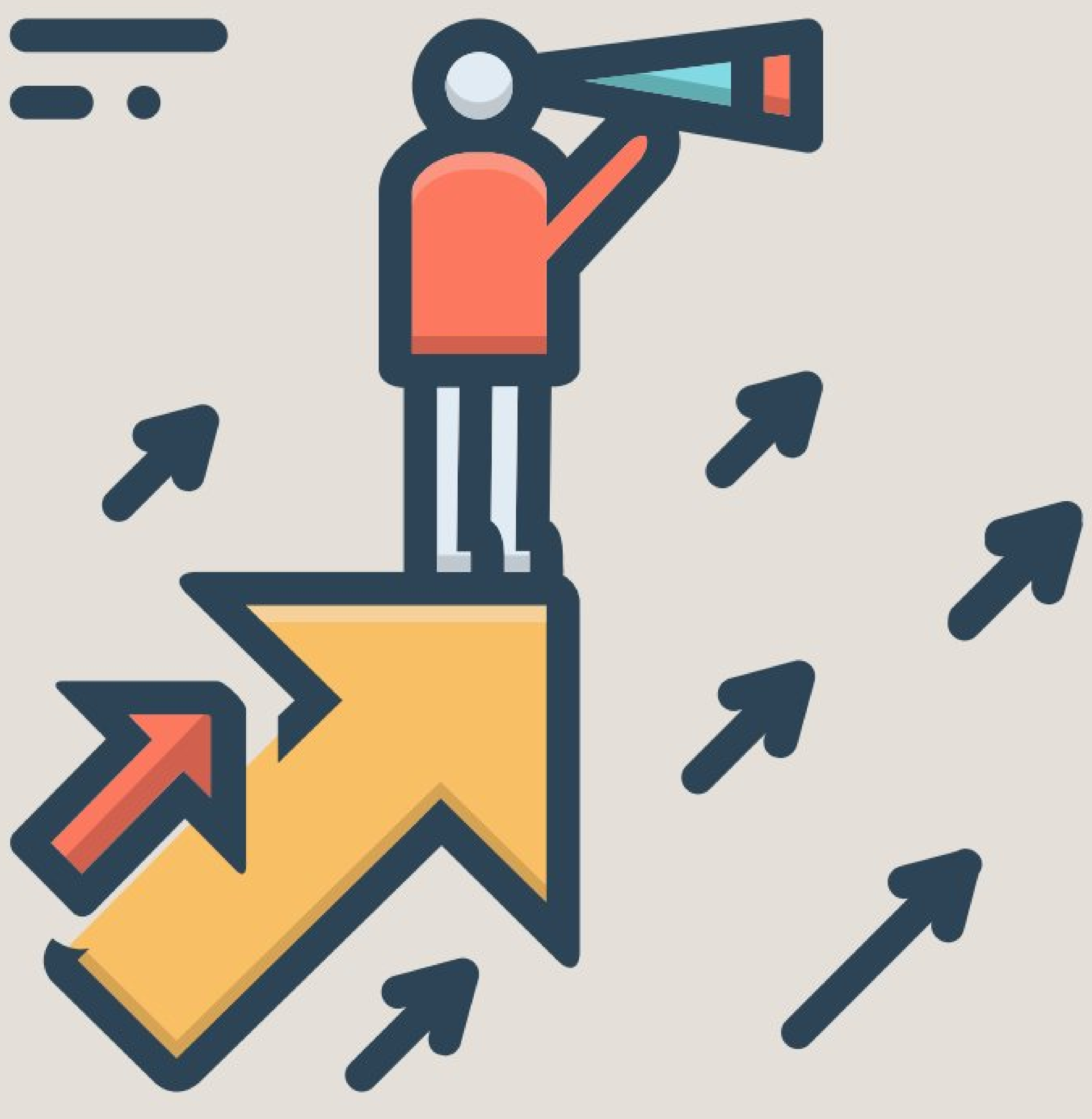
It has given enormous gratification to coordinate the editorial team of —SANDARBH , our Civil Engineering Department magazine in all aspects, covering academic activities, technical events of the students in contributing articles to the magazine.

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 qualityprograms and servicesin Civil Engineering fields.

# MISSION

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

# LABORATORIES

- Strength of materials
- Engineering geology
- Instrumentation lab
- Transportation lab
- Software lab
- Project lab
- Fluid mechanics lab
- Survey lab
- Concrete /CMTlab I & II
- Theory of structure lab
- Geotechnical engineering lab

# MAJOR SOFTWARES

- STAAD Pro
- Auto CAD
- AutoDesk Civil3D 2009
- Primavera P 6.2
- Primavera Contractor
- ANSYS
- SAP 2000
- Abaqus 6.12
- ETABS
- GMS ver 6.5
- AFT Impulse4.0
- STAAD Pro Foundation+Section Wizard
- Abaqus 11.2
- DIANA FEA
- MIDAS GEN

# MAJOR EQUIPMENT

Total Station

UTM &CTM

Weather Station

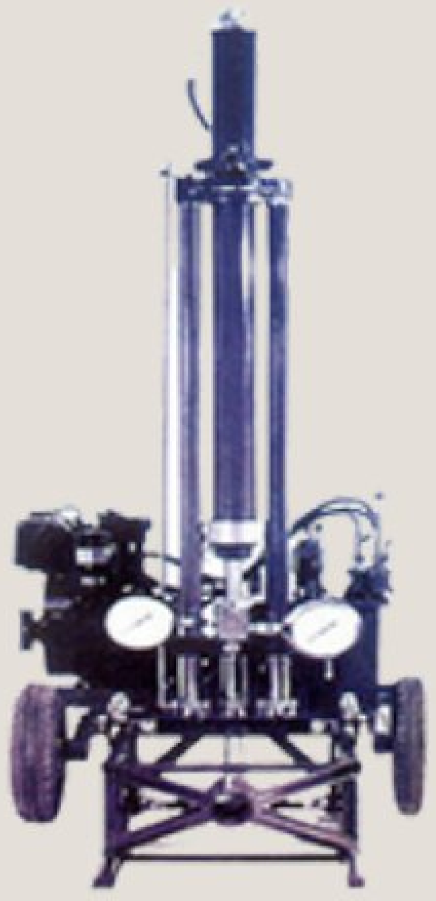
CBR Test Apparatus

Pumps and Turbines

Bituminous Testing Apparatus

Polariscope

DCPT



SCPT


Data Logger

# RESEARCH WORKS BY STUDENTS

## DIASTER RESISTANT BUILDING

**Atharva Malviya, Priyanka Lilhare, Ansh Jain, Urvashi Sen, Pooja Nagle, Harsh Paliwal**

Undergraduate , Civil Engineering Department, IPS

***Abstract***

***Disaster means the occurrence of an uncontrolled, painful, and serious condition. Like earthquakes, Volcano eruptions, cyclones, fires, Land sliding, Tsunami, Flood Earthquake are the indication of transformation in the earth's internal structure. Through it is not possible to prevent an earthquake, the least that can be achieved in reducing the damage is to make the building earthquake resistant. An earthquake is a sudden, rapid shaking of the earth's surface caused by the breaking and shifting of the rocks. It causes a vibration of the structure and includes inertia forces them. As a result of structure may collapse into loss of property and life earthquake-resistant construction, the fabrication of a building or structure that is able to withstand the sudden ground shaking that is characteristic of earthquakes, thereby minimizing structural damage and human deaths and injuries. Suitable construction methods are required to ensure that proper design objectives for earthquake-resistance are met Construction methods can vary dramatically throughout the world, so one must be aware of local construction methods and resource availability before concluding whether a particular earthquake-resistant design will be practical and realistic for the region Designing, constructing, and operating buildings in a way that is disaster resistant is an innovative method to save lives. It is essential for averting suffering, safeguarding people's livelihoods, and assisting in the healing of communities.***

***This article gives a review on two global retrofitting techniques in the world; base isolation technique and Tuned mass damper, for manufacturing the buildings earthquake resistant. The properties of both structures are highlighted. The aim of retrofitting technique is to improve the lateral strength of the structure and increase the strength and ductility of structure .Earthquake-resistant construction requires that the building be properly grounded and connected through its foundation to the earth. Building on loose sands or clays is to be avoided, since those surfaces can cause. Excessive movement and non-uniform stresses to develop during an earthquake. Furthermore, if the foundation is too shallow, it will deteriorate, and the structure will be less able to withstand shaking. The foundation should therefore be constructed on firm soil to maintain a structure that settles uniformly under vertical loading***

**Keywords—*soil liquefaction,catastrophe,energy Dissipation,Viscodampers***

### 1. Disaster Resistant Building

Disaster means occurrence of uncontrolled, painful and serious circumstances. There are various natural disaster

like: Earthquakes ,Cyclones ,Fire, Flood.

Earthquakes, cyclone and fire needs special considerations in building design and construction since they are more frequent, widespread and more disastrous. In this report aspect of building design and constructions are discussed.

**Table 1* : Natural Disaster Events and Economic Losses Decadewise.**

| Decade | 1960s | 1970s | 1980s | 1990s |
|---|---|---|---|---|
| Numbers | 27 | 47 | 63 | 84 |
| Economic losses (US $ billion) | 73.1 | 131.5 | 204.2 | 591 |

TABLE 1

**Table 2* : Data for All Catastrophes 1985 - 2000**

TABLE 2

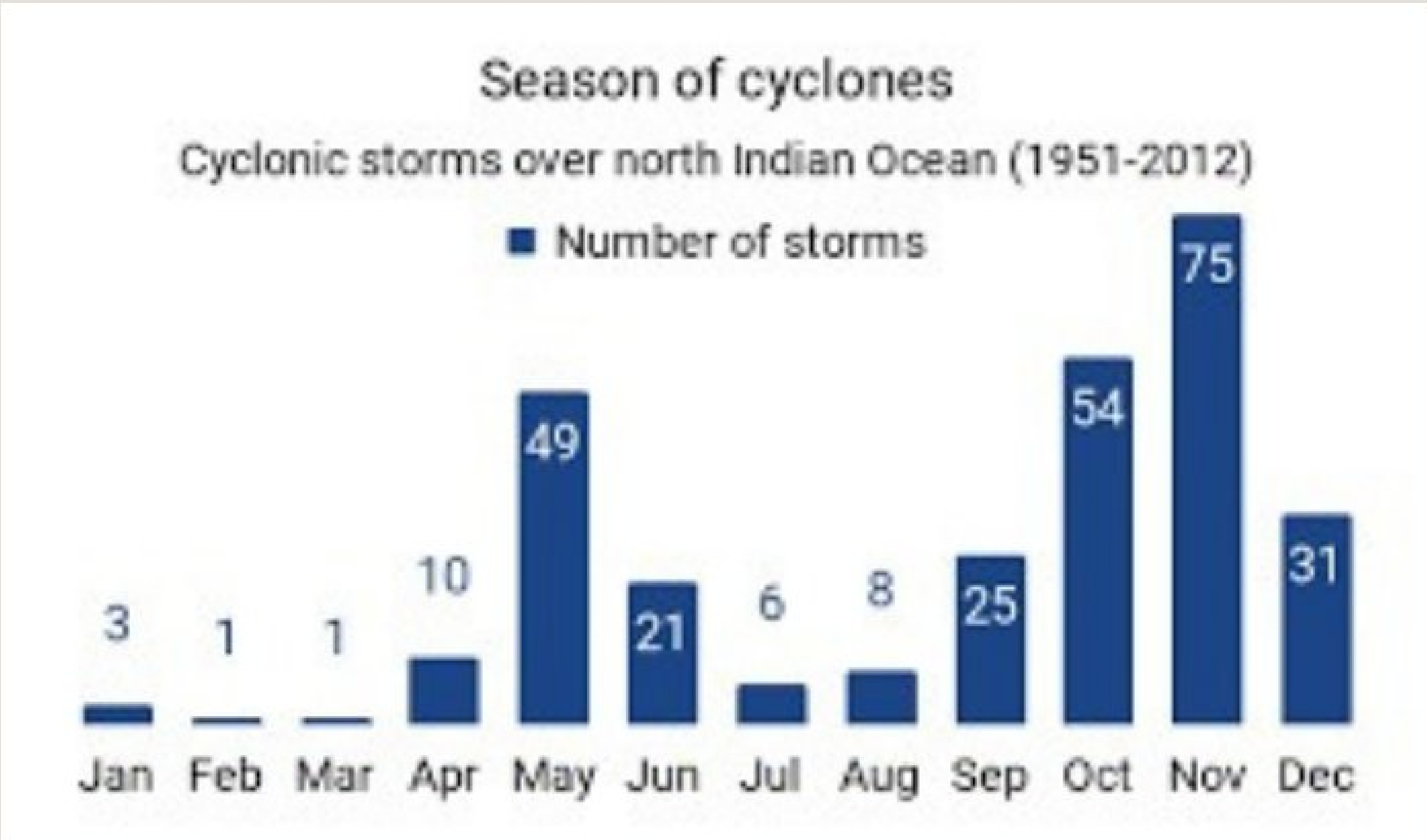
| Item | World | Asia-Pacific | % |
|---|---|---|---|
| Loss Events (Nos.) | 8,350 | 3,220 | 38.6 |
| Economic Losses US$ million | 8,95,800 | 4,26,270 | 47.6 |
| Insured Losses US$ million | 1,69,940 | 21,970 | 12.9 |
| Loss of Life (Nos.) | 5,36,250 | 4,33,480 | 80.8 |

### 1.1 CYCLONE

Tropical cyclones, also known as typhoons or hurricanes, are among the most destructive weather phenomena. They are intense circular storms that originate over warm tropical oceans, and have maximum sustained wind speeds exceeding 119 kilometres per hour and heavy rains. Depending on the maximum sustained wind speed, tropical cyclones will be designated as follows:

It is a tropical depression when the maximum sustained wind speed is less than 63 km/h.
It is a tropical storm when the maximum sustained wind speed is more than 63 km/h. It is then also given a name.
Depending on the ocean basins, it is designated either a hurricane, typhoon, severe tropical cyclone, severe cyclonic storm or tropical cyclone when the maximum sustained wind speed is more than 119 km/h.

Tropical cyclones occur in the south Pacific Ocean and Indian Ocean.




GRAPH 1

From 1998-2017, storms, including tropical cyclones and hurricanes, were second only to earthquakes in terms of fatalities, killing 233 000 people. During this time, storms also affected an estimated 726 million people worldwide, meaning they were injured, made homeless, displaced or evacuated during the emergency phase of the disaster.Over the past 30 years the proportion of the world's population living on cyclone-exposed coastlines has increased 192 percent, thus raising the risk of mortality and morbidity in the event of a tropical cyclone.

**1.1.1 NAME OF CYCLONE AND FALTALITIES CAUSED BY THEM**

| Name of cyclones | Year | Deaths of people |
|---|---|---|
| Bhola Cyclone | 1970 | 5,00,000 |
| Cyclone Sidr | 2007 | 10,000 |
| Cyclone Aila | 2009 | 190 |
| Cyclone Roanu | 2016 | 26 |
| Cyclone FANI | 2019 | 3 |
| Cyclone Bulbul | 2019 | 23 |

TABLE 3

BHOLA CYCLONE -Affected areas: India, East Pakistan . Damage: $86.4 million (1970 USD). Highest wind speed: 240 km/h

CYCLONE SIDR-Affected areas: Bangladesh, India, Southwest China. Damage: $2.31 billion (2007 USD). Highest wind speed: 260 km/h

CYCLONE AILA-Affected areas: Bangladesh, India. Damage: At least $1 billion (2009 USD). Highest wind speed: 120 km/h

CYCLONE ROANU - Affected areas: Bangladesh, Sri Lanka, Myanmar (Burma),East coast of India. Highest wind speed: 110 km/h. Damage: $2.13 billion (2016 USD)

CYCLONE FANI- Affected areas: Odisha, Bangladesh, Andhra Pradesh, Sri Lanka, Bhutan, East India. Damage: $8.1 billion (2019 USD) (Third costliest cyclone recorded in the Indian Ocean).Highest wind speed: 250 km/h

CYCLONE BULBUL -Affected areas: Bangladesh, Vietnam, Thailand, Myanmar (Burma), East India, Cambodia, Laos, Andaman and Nicobar Islands. Damage: $3.54 billion (2019 USD). Highest wind speed: 155 km/h

**1.1.2 PREVENTION TO BE TAKEN**

On the part of government

Cyclone forecast and warning system must be installed.
Information about cyclone should be given to the people in time through rapid communication system.
Construction of cyclone-shelter in cyclone-prone areas.
Administrative arrangement should be taken to move people faster to safer places.
On the part of the people should follow the essential guidelines provided by the agencies through TV radio, phones, etc.

Proper arrangement should be made to shift the essential household goods, domestic animals, etc. to the safer places.

Avoid driving on road which are under water because flood might have damaged the road.
Phone numbers of all the emergency services like police, fire brigade, hospitals, etc. should be kept ready.

### 1.2 FIRE

Fires start when a flammable and/or a combustible material with an adequate supply of oxygen or another oxidizer is subjected to enough heat. For a fire to exist it requires three elements to be in place Heat, Oxygen and Fuel. This is known as the Fire Triangle.

#### 1.2.1 OCCURRENCE

Fire occurrences in a particular building are really rare events. It is assumed that fires occur in accordance with the Poisson process and the number of fire occurrences in time interval can be modeled by a Poisson distribution. Using data such as the numbers of annual fire occurrences and building floor area the probability of fire occurrence in different occupancies can be estimated. In addition, the relation between the numbers of fire occurrence and the time of fire occurrence are clearly discussed. Investigations for different groups of building occupancy are illustrated in this research. Based on mean fire ignition rates and floor areas of different occupancies results show the ranking order regarding annual fire ignition per unit floor area among these occupancies. Industrial occupancy has the highest value of annual fire ignition rate, followed by residential occupancy. The rate of fire ignition only increases in public occupancy in Taiwan.

#### 1.2.2 AFFECTS OF FIRE ON BUILDING MATERIALS

Steel will have lost two-thirds of its strength by the time it has been heated to 600°C.
Timber burns at a constant rate - members can be oversized to provide fire resistance, as they tend to char on their surface, but then burn relatively slowly.

Concrete fairly resistant to fire, but reinforced concrete must have sufficient insulation to protect the steel reinforcement.

Bricks are one of the most fire resistant materials.

#### 1.2.3 SCHEMING OF BUILDING ACCORDING TO FIRE SAFETY NORMS

The design of any building and the type of materials used in its construction are important factors in making the building resistant to a complete burn-out and in preventing the rapid spread of fire, smoke or fumes, which may otherwise contribute to the loss of lives and property.
The fire resistance of a building or its structural and non-structural elements is expressed in hours against a specified fire load which is expressed in kcal/m2, and against a certain intensity of fire. All buildings depending upon the occupancy use and height shall be protected by fire extinguishers, wet riser, down-comer, automatic sprinkler installation, high/medium velocity water spray, foam, gaseous or dry powder.
Fire Extinguisher - Fixed carbon dioxide fire extinguishing installation shall be provided in accordance with good practice on premises where water or foam cannot be used for fire extinguishing because of the special nature of the contents of the buildings/areas to be protected. For some special fire risk/essential applications, carbon dioxide may not be suitable and it may be necessary to provide BCF (Bromochlorodifluoromethane) — Halon 1211 or BTM (Bromochlorotrifluoromethane) — Halon 1301 or some other identified substitutes.

Automatic High Velocity Water Spray or Emulsifying System-Automatic high velocity water spray or emulsifying system shall be provided for protection of indoor oil-cooled transformers.

#### 1.2.4 FIRE STATISTICS IN INDIA

As per the National Crime Records Bureau, about over 60 people die every day in India due to fire. Every year, about 25,000 persons die due to fires and related causes, in India. Women account for about 66% of those killed in fire accidents. Fire accounts for about 6% of the total deaths reported due to natural and unnatural causes. Bulk of the cases reported every year are under the other causes category. Between 2001 and 2014, a total of 3.16 lakh fire accident cases were reported in the country. More than 20000 cases were reported in 12 of the 14 years. The highest number of cases were reported in 2011 (26343). The number of cases reported witnessed a mixed trend in the last 14 years. The number of cases saw a decline from 2001 to 2004 only to increase continuously from 2004. This increasing trend continued till 2011 only to be followed by a decreasing trend till 2014.


GRAPH 2

### 1.3 FLOOD

A flood happens when water overflows or soaks land that is normally dry. There are few places on Earth where people don't need to be concerned about flooding. Generally, floods take hours or even days to develop, giving residents time to prepare or evacuate. Sometimes, floods develop quickly and with little warning.

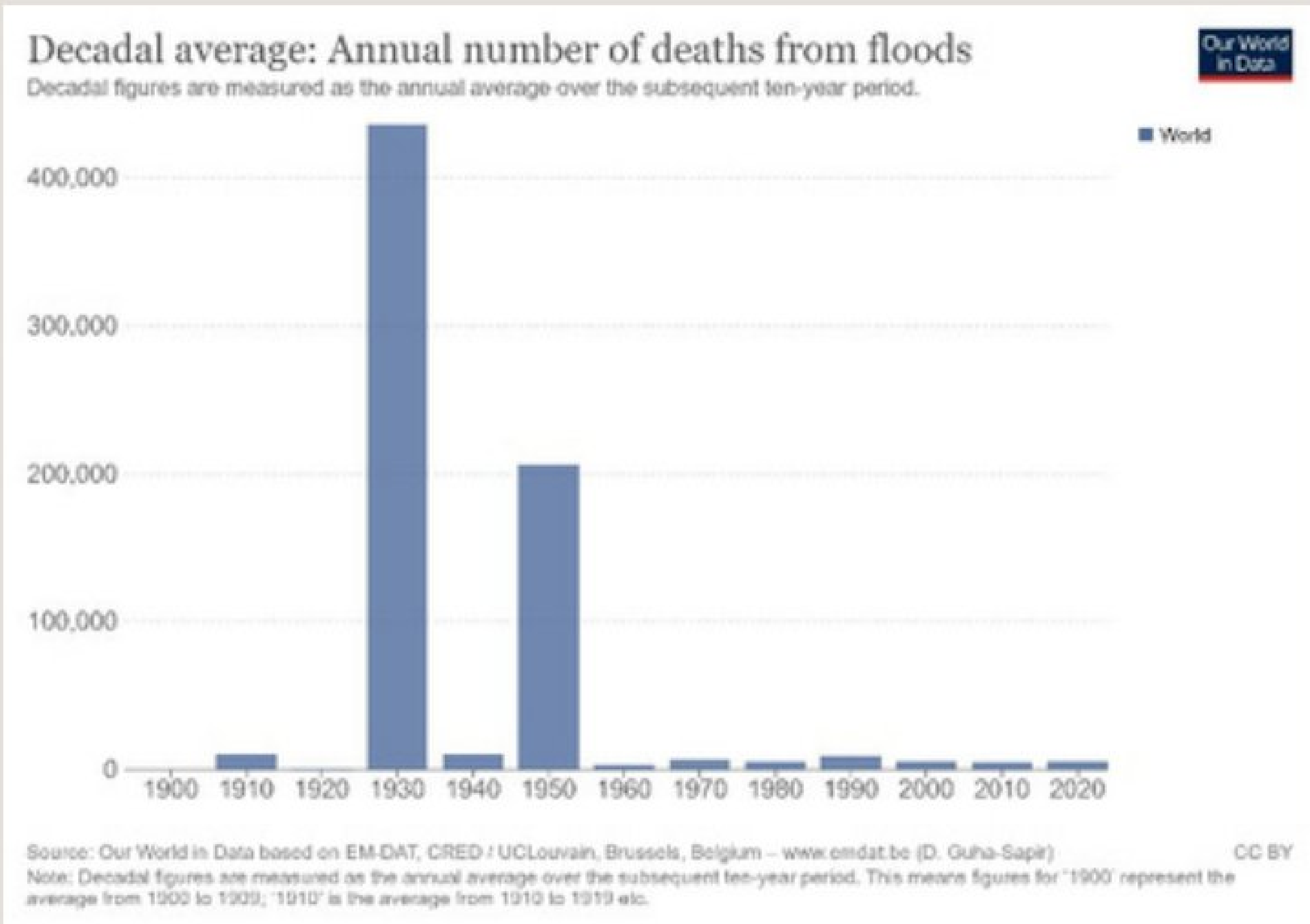
#### 1.3.1 EFFECTS OF FLOOD ACROSS THE WORLD

When flood waters recede, affected areas are often blanketed in silt and mud. This sediment can be full of nutrients, benefiting farmers and agribusinesses in the area. Famously fertile flood plains like the Mississippi River valley in the American Midwest, the Nile River valley in Egypt, and the Fertile Crescent in the Middle East have supported agriculture for thousands of years. Yearly flooding has left millions of tons of nutrient-rich soil behind.

Floods erode soil, taking it from under a building's foundation, causing the building to crack and tumble. Severe flooding in Bangladesh in July 2007 led to more than a million homes being damaged or destroyed.

As flood water spreads, it carries disease. Flood victims can be left for weeks without clean water for drinking or hygiene. This can lead to outbreaks of deadly diseases like typhoid, malaria, hepatitis A, and cholera. This happened in 2000, as hundreds of people in Mozambique fled to refugee camps after the Limpopo River flooded their homes. They soon fell ill and died from cholera, which is spread by unsanitary conditions, and malaria, spread by mosquitoes that thrived on the swollen river banks. In the United States, floods are responsible for an average of nearly 100 deaths every year, and cause about $7.5 billion in damage.

China's Yellow River valley has seen some of the world's worst floods in the past 100 years. The 1931 Yellow River flood is one of the most devastating natural disasters ever recorded—almost a million people drowned, and even more were left homeless .




GRAPH 3

#### 1.3.2 PREVENTATIVES TAKEN TO REDUCE IMPACT OF FLOOD

Floods are among the most common and destructive natural disasters. They affected more than 2 billion people worldwide between 1987 and 2017, according to the World Health Organization. As floods keep increasing in frequency and intensity due to climate change, flood-proof architecture is becoming an issue of growing importance.

The following are four examples of flood-proof architecture in parts of the world with unique flooding risk profiles. They each serve a different purpose, employ techniques informed by their own geographies, and showcase various scales.

**An Ecological Wetland Park in China**

Situated on a 26-hectare land hugging three rivers, Yanweizhou Park of Jinhua City in China sits on a high-risk spot for floods. However, Turenscape Landscape Architecture translated these risks into a poetic landscape.

The site, which was the home of an unattractive concrete floodwall, is now an award-winning wetland park. Its terraced landscape resembling rice fields absorbs floodwater, which nourishes the park's plants throughout the year.

**2. An Art Museum in the US**

The flood-proof architecture of the Crystal Bridges Museum of American Art in Arkansas boasts an unlikely combination: The museum, which was designed by Safdie Architects, double-functions as a dam.

Two suspended-cable-and-timber bridge-like structures span the ravine, creating two ponds. Thus, any excess rainfall collects in these mini dams to mitigate the risk of flooding. These semi-natural ponds protect the museum, provide dramatic vistas to galleries, while inviting the visitors to think about the relationship between water and people.

**3. A Sculptural Promenade in Germany**

The sculptural Niederhafen River Promenade in Hamburg in Northern Germany was an integral part of the city's flood prevention upgrades. Built by Zaha Hadid Architects, the structure replaced the dilapidated systems from 1964.

The structure flood-proofs Hamburg while also elevating the city center. The promenade's elegant design also incorporates staircases like an amphitheater, a three-story restaurant, and shops at street level.

Figure 1

The River Promenade in Hamburg (Germany) built by Zaha Hadid Architects / © Piet Niemann (further edited by dormakaba to fit in blog color scheme)

**4. A Flood-Proof Family Home in Vietnam**

Flood-proof architecture doesn't have to be just large-scale projects, as evidenced by this humble family home in Vietnam.

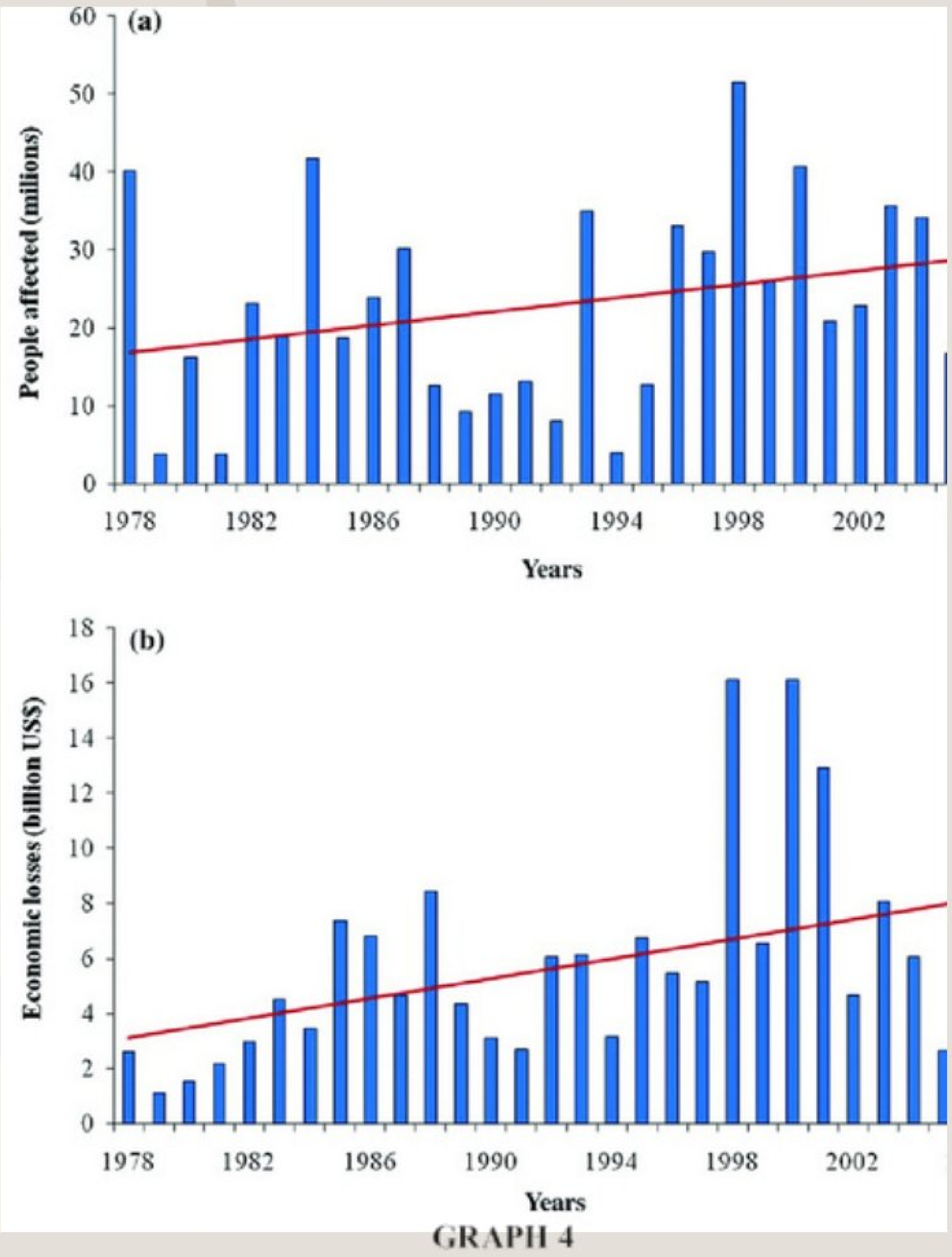
In the country's north-center Nghệ an Province, flooding is a common problem, and the water levels can reach 150 centimeters. Hence, the local firm Nha4 Architects designed a flood-proof house for a retired couple and their son to be safe from it. "In the past, the family had to live temporarily in a neighborhood shelter when it flooded, so we raised this new building 150 centimeters above the ground," said architect Nguyen Khac Phuoc.

The modest house used local materials and techniques to cantilever a previously unsafe structure.

Figure 2

Floor plan showing how the single-family house in Vietnam, that has been made flood-proof by raising it 150cm above the ground

As floods are impacting communities of all geographic, cultural, and economic backgrounds, flood-proofing is no longer a concern for only waterfront settlements. With this rising awareness in building and construction circles, we'll likely keep seeing many more examples of flood-proof architecture of various scales in the next coming decades.



GRAPH 4

**TOTAL NUMBER OF PEOPLE AFFECTED AND ECONOMIC LOSSES DUE TO FLOODS IN INDIA DURING THE PERIOD 1978-2006.**

**A EOPLPAFFECTED AND**

**B ECONOMIC LOSSES**

### 1.4 EARTHQUAKE

Earthquake is a tectonic or volcanic phenomena that depicts rock movement which causes the earth to shake or tremble. Earthquakes are one of the most terrifying natural occurrences. Due to its peculiar geophysical factors, India is extremely vulnerable to earthquakes of various magnitudes. Several million earthquakes occur each year all around the planet. Several devastating earthquakes have struck the country in the previous years, causing a considerable amount of fatalities and property damage. Five earthquakes measuring M8 or more hit various areas of the globe during the last century:

- Uttarkashi (1991) M6.6
- Latur (1993) M6.4
- Jabalpur (1997) M6.0g
- Chamoli (1999) M6.8
- Bhuj (2001) M6.9.

Other earthquakes (Muzaffarabad in 2005 M7.6; Great Sumatra earthquake, 2004 M9.1) that occurred outside Indian territory had a significant impact on the country as well. Table 1 displays the recurrence of earthquakes by area over the last 110 years.

| SEISMIC REGION | NO.OF EARTHQUAKES OF MAGNITUDE | | | | RETURN PERIOD |
|---|---|---|---|---|---|
| | 5-0.5.9 | 6.0-6.9 | 7.0-7.9 | 8.0+ | |
| Kashmir & Western Himalayas | 25 | 7 | 2 | 1 | 2.5-3 yrs. |
| Central Himalayas | 68 | 28 | 4 | 1 | 1yrs. |
| North East India | 200 | 128 | 15 | 4 | <4Months |
| Indo-Gangetic Basin and Rajasthan | 14 | 6 | - | - | 5yrs |
| Cambay and Rann of Kutch | 4 | 4 | 1 | 1 | 20 yrs. |
| Peninsular India | 31 | 10 | - | - | 2.5-3 yrs. |
| Andaman & Nicobar | 80 | 68 | 1 | 1 | <8 months |

**Table 1** Regionwise major earthquakes in India

TABLE 4

Indian Standard 1893 (Part 1) (Sixth Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Earthquake Engineering Sectional Committee had been approved by the Civil Engineering Division Council.

India is prone to strong earthquake shaking, and hence earthquake resistant design is essential. The Committee has considered an earthquake zoning map based on the maximum intensities at each location as recorded from damage surveys after past earthquakes, taking into account,

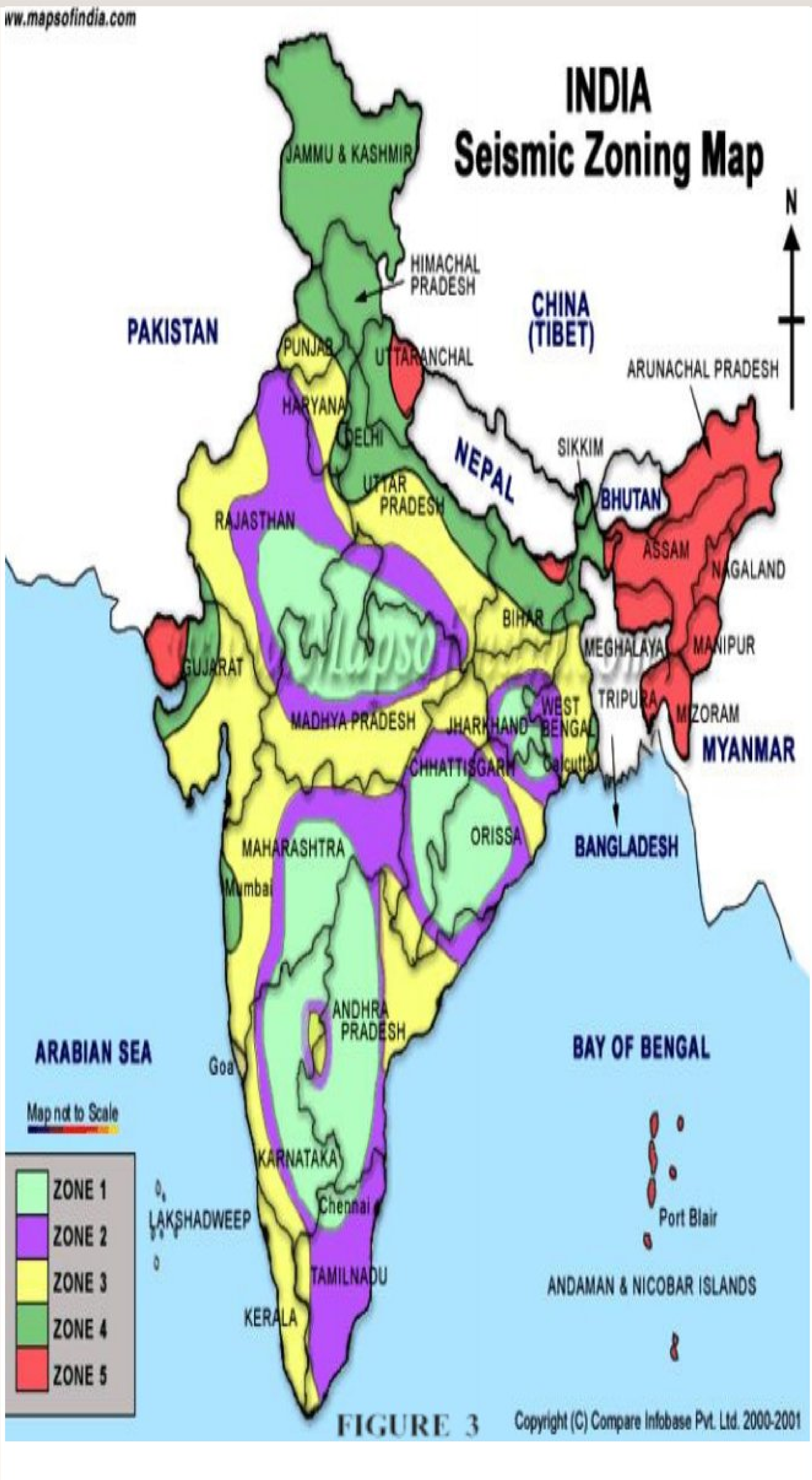
a) known magnitudes and the known epicenters (see Annex A) assuming all other conditions as being average; and

b) tectonics (see Annex B) and lithology (see Annex C) of each region.

The Seismic Zone Map (see Fig. 3 ) is broadly associated with 1964 MSK Intensity Scale (see Annex D) corresponding to VI (or less), VII, VIII and IX (and above) for Seismic Zones II, III, IV and V, respectively. Seismic Zone Factors for some important towns are given in Annex E

### 1.4.1 SESIMIC ZONES

Seismic zones of India According to the magnitude of the damage or the frequency at which earthquakes occur, the country has been divided into regions or zones. The seismic coefficient can be used to design buildings in various parts of the nation by referring zoning charts given by National Institute of Disaster Management. The four zones of earthquake in India, as discussed below:




Seismic Zone II: Zone II is classified as the low-damage risk zone. This is the least seismically active zone, meaning the areas that fall under these zones in India have a low chance of having an earthquake. Zone II covers earthquake-prone areas, which are 41% of India. Here, the Indian Standard (IS) Code allots a zone factor of 0.10.

Seismic Zone III: Seismic Zone 3/III is classified as the moderate-damage risk zone. Here, the IS Code allots 0.16 to this zone. Zone III, or moderate earthquake zone, covers 30% of India.

Seismic Zone IV: Zone IV is considered the high-damage risk zone. The IS Code allots 0.24 to this zone. Moreover, 18% of the total area of the country belongs to Zone IV.

Seismic Zone V: Zone V has the highest risk of damaging earthquakes. The IS Code has assigned a factor of 0.36 for this very high-risk damage zone. Around 11% of India falls under Zone V.

Note: There are no cities in India which fall under Seismic Zone I

### 1.4.2 DAMAGE CAUSED BY EARTHQUAKE

Earthquakes can strike suddenly and without warning. An earthquake is a violent and abrupt shaking of the ground, caused by movement between tectonic plates along a fault line in the earth's crust. Earthquakes can result in the ground shaking, soil liquefaction, landslides, fissures, avalanches, fires and tsunamis. The extent of destruction and harm caused by an earthquake depends on:

magnitude

intensity and duration

the local geology

the time of day that it occurs

building and industrial plant design and materials

the risk-management measures put in place

Between 1998-2017, earthquakes caused nearly 750 000 deaths globally, more than half of all deaths related to natural disasters. More than 125 million people were affected by earthquakes during this time period, meaning they were injured, made homeless, displaced or evacuated during the emergency phase of the disaster.

Table 1.1: Brief overview of earthquake incidents in India

| Date | Location | Magnitude / MSK Intensity | Remarks |
|---|---|---|---|
| 8 February, 1900 | Coimbatore | 6.0/VII | Shock was felt throughout south India. Coimbatore and Coonoor worst affected. |
| 4 April, 1905 | Kangra | 8.0/X | ~19,000 deaths. Considerable damage in Lahore. High intensity around Dehradun and Mussorie VIII |
| 15 January, 1934 | Bihar-Nepal | 8.3/X | ~7,000 deaths in India and ~3,000 deaths in Nepal. Liquefaction in many areas. |
| 26 June, 1941 | Andaman & Nicobar Islands | 7.7/VIII | Triggered Tsunami-1.0m high on the east coast, causing many deaths. |
| 15 August, 1950 | Assam-Tibet | 8.6/XII | About 1,500 deaths in India and ~2,500 in China. Caused huge landslides which blocked rivers and later caused flood. |
| 21 July, 1956 | Anjar (in Kutch) | 6.1/IX | About 115 deaths. Part of Anjar on rocky sites suffered much less damage comparatively. |
| 10 December, 1967 | Koyana, Maharashtra | 6.5/VIII | About 180 deaths. Caused significant damage to the concrete gravity dam. |
| 21 August,1988 | Bihar-Nepal | 6.6/IX | About ~709 deaths. |
| 20 October, 1991 | Uttarkashi | 6.4/IX | ~750 deaths. 56m span Gawana bridge 6 km from Uttarkashi collapsed. |
| 30 September, 1993 | Killari, Maharashtra | 6.2/IX | ~8,000 deaths. Most deadly earthquake in India since Independence. |
| 22 May, 1997 | Jabalpur | 6.0/VIII | ~40 deaths and ~1,000 injured. Concrete frame buildings with open ground storey suffered damage. |
| 26 January, 2001 | Bhuj (Kutch) | 7.7/X | ~13,800 deaths. Numerous modern multistorey buildings collapsed. Number of medium and small earth dams severely damaged. |
| 26 December, 2004 | Sumatra | 9.4/VI (in Andaman) | Caused most devastating Tsunami in the history resulting in ~2,27,898 deaths in 14 countries. |
| 8 October, 2005 | Kashmir | 7.6/VIII | Poor performance of masonry buildings caused many life losses. Unique construction found in this region Dhajji Diwari showed very good seismic performance. |
| 28 September, 2011 | Sikkim | 6.9/VI | ~80 deaths. Large number of landslides, significant damage to the buildings and infrastructure. |

Source: (S. K. Jain 2016)

TABLE 5

### 1.4.3 EARTHQUAKE RESISTANCE CONSTRUCTION

Earthquake-resistant construction refers to the design of a structure or building that can withstand the rapid ground shaking that happens during earthquakes, decreasing structural damage as well as human deaths and injuries. Appropriate construction procedures are required to ensure that correct design objectives for earthquake resistance are accomplished. Because construction methods vary so widely over the world. The design of a building and the construction procedures utilized to construct that building are fundamentally different. Advanced earthquake resistant designs can only be successful if suitable construction procedures are applied in the site selection, base, structural members, and link joints. Structures and structural elements designed to withstand earthquakes frequently have ductility (the ability to bend without breaking).

### C AN BE T RULY EARTHQUAKE P BUILDINGS ROOF?

100% earthquake resistant buildings do not exist anywhere in this world. Engineers and archaeologists are still trying to find something that is stronger than earth. Scientifically-backed design processes capitalize on the knowledge that we have gained on earthquakes. This knowledge has granted us the ability to make earthquake resistant buildings. The effects of disasters like earthquakes can be handled quite well. Especially with the construction of earthquake resistant buildings.

Behaviour of Tall Buildings to Ground Motion

During earthquakes, ground vibrations induce inertia forces at mass locations in the house. These forces pass to the base via the roof and walls. The main focus is on ensuring that these requirements are met. Without causing significant damage or failure, the powers hit the ground. The roof, wall, and foundation are the three components of a masonry building. The walls are the most resistant to earthquake damage caused by horizontal forces. When pushed horizontally at the top in a direction perpendicular to its plane (the poor direction), a wall topples quickly, but when pushed along its length, it provides much more resistance (termed strong direction).

### 1.4.4 BUILDINGS

The four main desirable attributes of an earthquake resistant building are:

a) Robust structural configuration,

b) Appropriate elastic lateral stiffness,

c) Adequate lateral strength,

d) Sufficient ductility.

### 1.4.5 Regular and Irregular Configurations

Buildings with simple regular geometry and uniformly distributed mass and stiffness in plan and in elevation, suffer much less damage, than buildings with irregular configurations. All efforts shall be made to eliminate irregularities by modifying architectural planning and structural configurations. A building shall be considered to be irregular for the purposes of this standard, even if any one of the conditions given in IS1893 (Part 1) in Tables 5 and 6 is applicable. Limits on irregularities for Seismic Zones III, IV and V and special requirements.

### 1.4.6 Methods of construction of resistant building

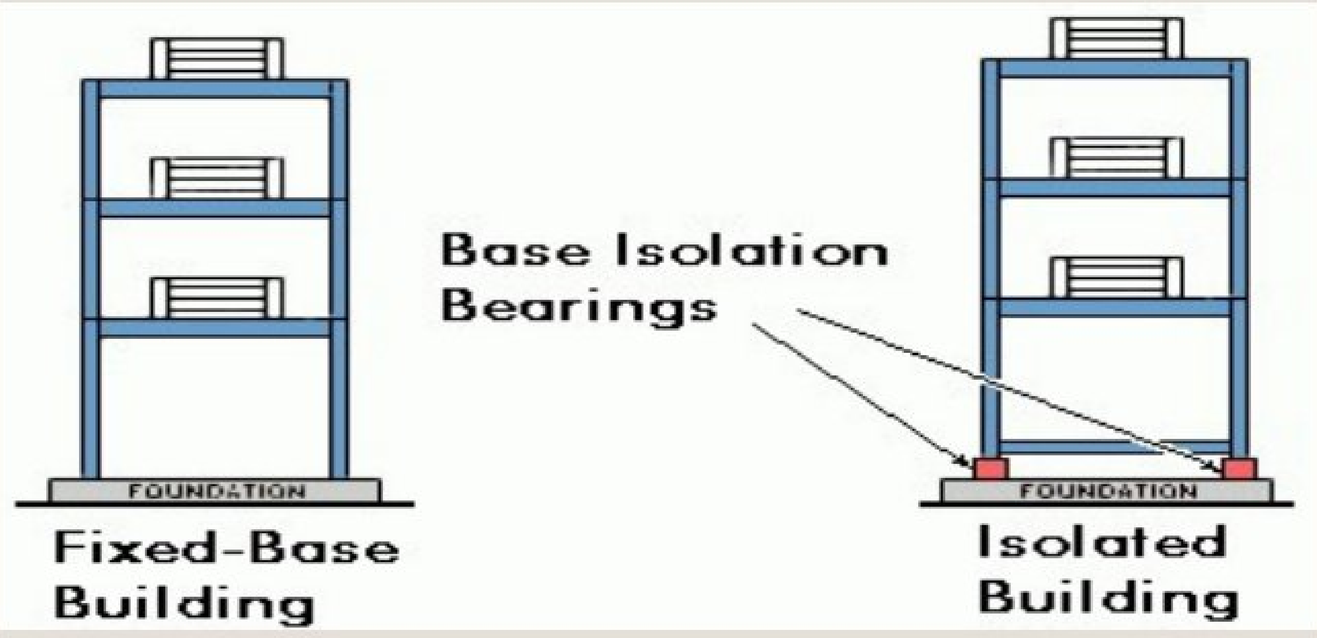
Create a flexible foundation
Shield buildings from vibrations
Vibrational control devices
Use of pendulum
Shear walls and diagonal cross braced

### 1.4.7 EARTHQUAKE RESISTANT DESIGN TECHNIQUES FOR BUILDINGS AND STRUCTURES

Among the most important advanced techniques of earthquake resistant design and construction are:

Base Isolation
Energy Dissipation Devices

**1.4.8 Base Isolation Method :** A base isolated structure is supported by a series of bearing pads which are placed between the building and the building's foundation. (See Figure 4) A variety of different types of base isolation bearing pads have now been developed. The bearing is very stiff and strong in the vertical direction, but flexible in the horizontal direction.




**1.4.8 (A)Earthquake Generated Forces :** To get a basic idea of how base isolation works, examine Figure 3. This shows an earthquake acting on both a base-isolated building and a conventional, fixed-base, building. As a result of an earthquake, the ground beneath each building begins to move. In Figure 5, it is shown moving to the left. Each building responds with movement which tends toward the right. The building
undergoes displacement towards the right. The building's displacement in the direction opposite the ground motion is actually due to inertia. The inertial forces acting on a building are the most important of all those generated during an earthquake. It is important to know that the inertial forces which the building undergoes are proportional to the building's acceleration during ground motion. It is also important to realize that buildings don't actually shift in only one direction. Because of the complex nature of earthquake ground motion, the building actually tends to vibrate back and forth in varying directions.

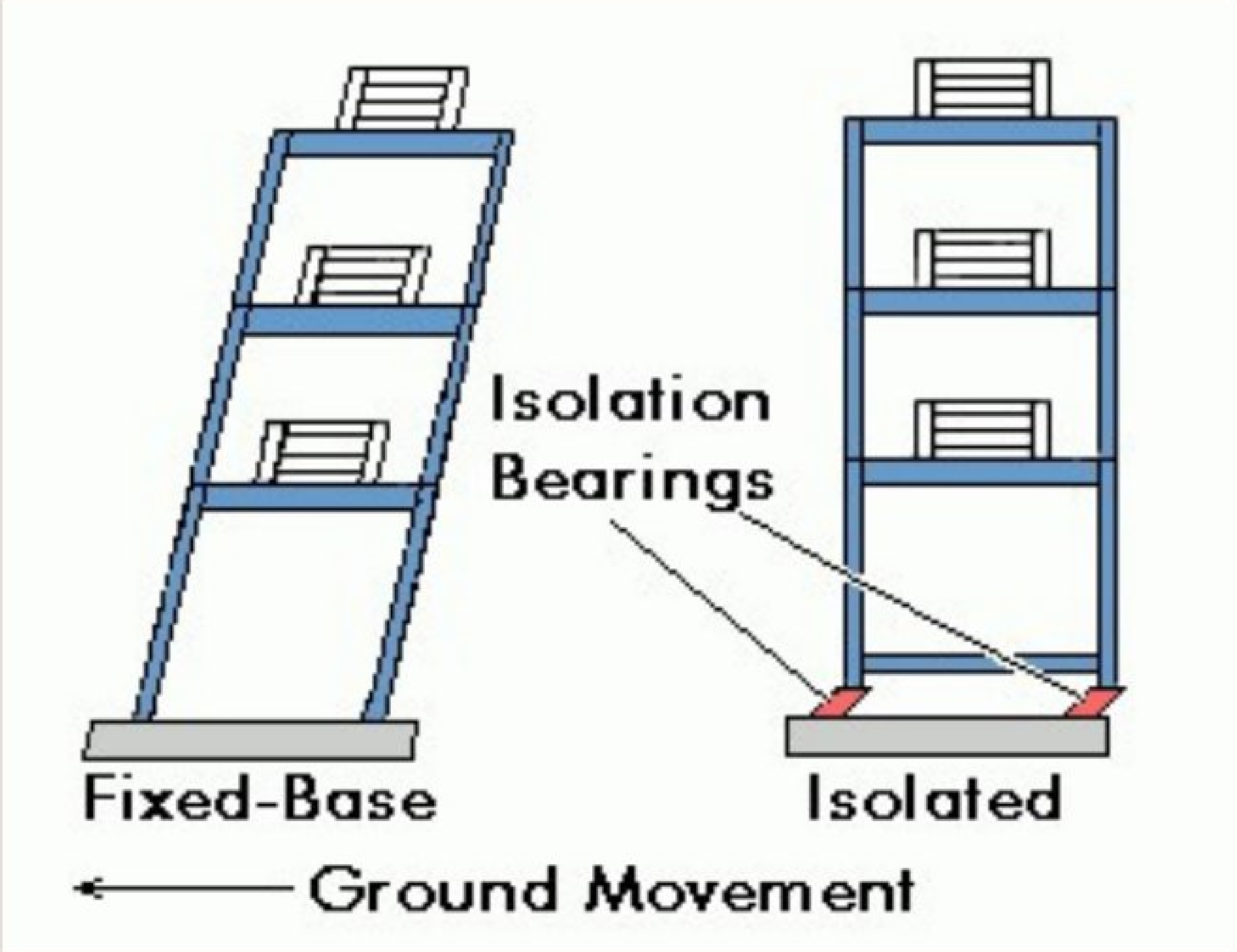



Figure 5

**1.4.8 (B) Deformation and Damages to Structures :** In addition to displacing toward the right, the un-isolated building is also shown to be changing its shape-from a rectangle to a parallelogram. It is deforming. The primary cause of earthquake damage to buildings is the deformation which the building undergoes as a result of the inertial forces acting upon it.

**1.4.8 (C)Response of Base Isolated Building :** By contrast, even though it too is displacing, the base-isolated building retains its original, rectangular shape. It is the lead-rubber bearings supporting the building that are deformed. The base-isolated building itself escapes the deformation and damage, which implies that the inertial forces acting on the base-isolated building have been reduced. Experiments and observations of base-isolated buildings in earthquakes have been shown to reduce building accelerations to as little as 1/4 of the acceleration of comparable fixed-base buildings, which each building undergoes as a percentage of gravity. As we noted above, inertial forces increase, and decrease, proportionally as acceleration increases or decreases. Acceleration is decreased because the base isolation system lengthens a building's period of vibration, the time it takes for the building to rock back and forth and then back again. And in general, structures with longer periods of vibration tend to reduce acceleration, while those with shorter periods tend to increase or amplify acceleration. Finally, since they are highly elastic, the rubber isolation bearings don't suffer any damage. But the lead plug in the middle of our example bearing experiences the same deformation as the rubber. However, it generates heat. In other words, the lead plug reduces, or dissipates, the energy of motion, i.e., kinetic energy--by converting that energy into heat. And by reducing the energy entering the building, it helps to slow and eventually stop the building's vibrations sooner than would otherwise be the case, in other words, it damps the building's vibrations.

Some application of base isolation techniques

Though the technology is still developing it has already been used in interminable number of structures.

It was firstly implemented in New-Zealand in 1974 and was first enforced in India in 2001 after Gujrat earthquake.

LA city hall (height 138m) in Los Angeles is the tallest base isolated building in the world.

It has found numerous applications in modern times such as retrofitting it in residential buildings, buildings of historical importance, monuments, bridges, etc.

Tomb of Cyrus is said to be the oldest base-isolated structure in the world. Los Angeles city hall constructed using Base Isolation Techniques.

Figure 6

**1.4.8 (D) Energy Dissipation Devices**

The second of the major new techniques for improving the earthquake resistance of buildings also relies upon damping and energy dissipation, but it greatly extends the damping and energy dissipation provided by lead-rubber bearings. As we've said, a certain amount of vibration energy is transferred to the building by earthquake ground motion. Buildings themselves do possess an inherent ability to dissipate, or damp, this energy. However, the capacity of buildings to dissipate energy before they begin to suffer deformation and damage is quite limited. The building will dissipate energy either by undergoing large scale movement or sustaining increased internal strains in elements such as the building's columns and beams. Both of these eventually result in varying degrees of damage. So, by equipping a building with additional devices which have high damping capacity, we can greatly decrease the seismic energy entering the building, and thus decrease building damage. Accordingly, a wide range of energy dissipation devices have been developed and are now being installed in real buildings. Energy dissipation devices are also often called damping devices. The large number of damping devices that have been developed can be grouped into three broad categories:

**Friction Dampers**: these utilize frictional forces to dissipate energy

**Metallic Dampers** : utilize the deformation of metal elements within the damper

**Viscoelastic Dampers** : utilize the controlled shearing of solids

**Viscous Dampers**: utilized the forced movement (orificing) of fluids within the damper

**1.4.9 Damping Devices and Bracing Systems**

Damping devices are usually installed as part of bracing systems. Figure 4 shows one type of damper-brace arrangement, with one end attached to a column and one end attached to a floor beam. Primarily, this arrangement provides the column with additional support. Most earthquake ground motion is in a horizontal direction; so, it is a building's columns which normally undergo the most displacement relative to the motion of the ground. Figure 7 also shows the damping device installed as part of the bracing system and gives some idea of its action.

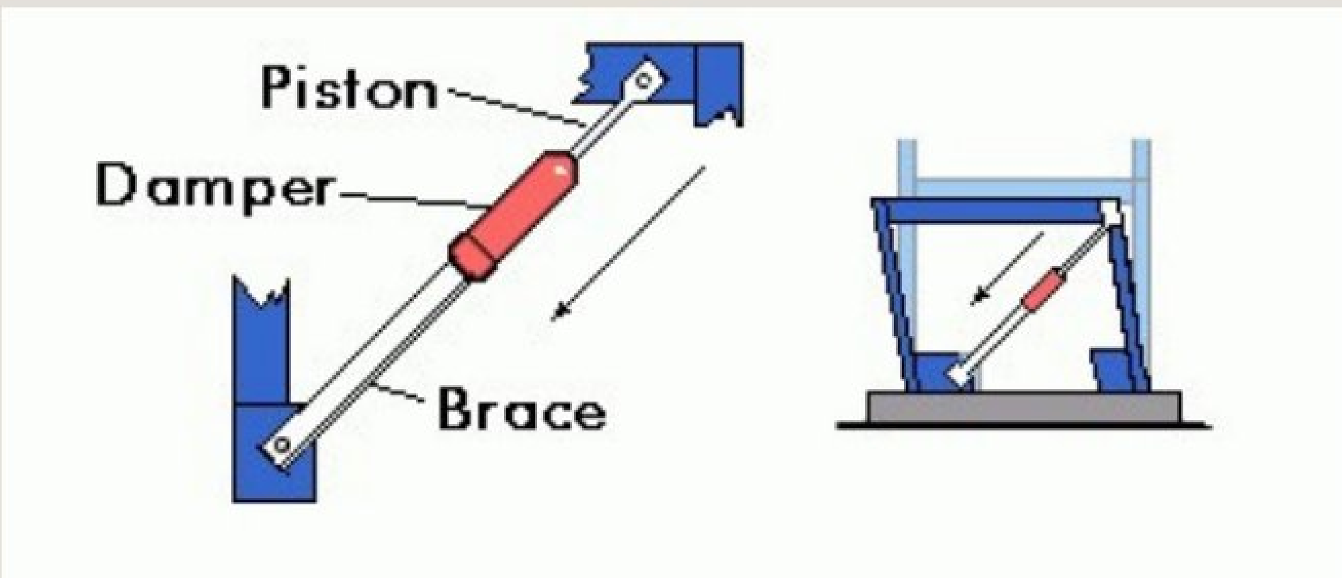



Figure 7

**1.4.10 Tuned Mass Dampers**

Tuned Mass Dampers (also called vibration absorbers or vibration dampers) is a device mounted to a specific location in a structure , so as to reduce the amplitude of vibration to an acceptable level whenever a strong lateral force such as an earthquake or high winds hit.

1.4.10 (A)Components of Tuned Mass Dampers

1. Spring (K2)
2. Oscillating mass (M2)
3. Viscodampers (C2)

1.4.10 (B)Types of Tuned Mass Damper (TMD)

Horizontal Tuned Mass Damper (TMD)

It is normally found in slender buildings, communication towers, spires and the like. Horizontal tuned mass damper (TMD) as shown in Fig. 7 composed of viscodampers and leaf springs or pendulum suspensions. it eats horizontal and torsional excitations.

Vertical Tuned Mass Damper (TMD)

It is usually applied in long span horizontal structures such as bridges, floors and walkways. Vertical tuned mass damper (TMD) as shown in Fig. 7 is a combination of coil springs and Viscodampers and it declines vertical vibrations.

Both types have similar functions, though there might be slight differences in terms of mechanism.

1.4.10 (C) Applications of Tuned Mass Dampers

Tuned mass dampers are mainly used in the following applications:

Tall and slender free-standing structures (bridges, pylons of bridges, chimneys, TV towers) which tend to be excited dangerously in one of their mode shapes by wind,

Stairs, spectator stands, pedestrian bridges excited by marching or jumping people. These vibrations are usually not dangerous for the structure itself, but may become very unpleasant for the people,

Steel structures like factory floors excited in one of their natural frequencies by machines , such as screens, centrifuges, fans etc.,

Ships exited in one of their natural frequencies by the main engines or even by ship motion.

Tuned Mass Dampers may be already part of the structure's original design or may be designed and installed later.

Taipei structure has TMD of weight 730 tonnes and has the largest diameter in the world Fig. 8 show Tuned Mass Damper of Burj Al Arab and Emirate Tower respectively.

Figure 8

ATC Tower Delhi Airport in New Delhi, India — a 50-ton tuned mass damper installed just beneath the ATC floor at 90m.


Figure 9

Statue of Unity in Gujarat, India – two tuned mass dampers of 250 ton each located at the chest level of Sardar Patel statue.

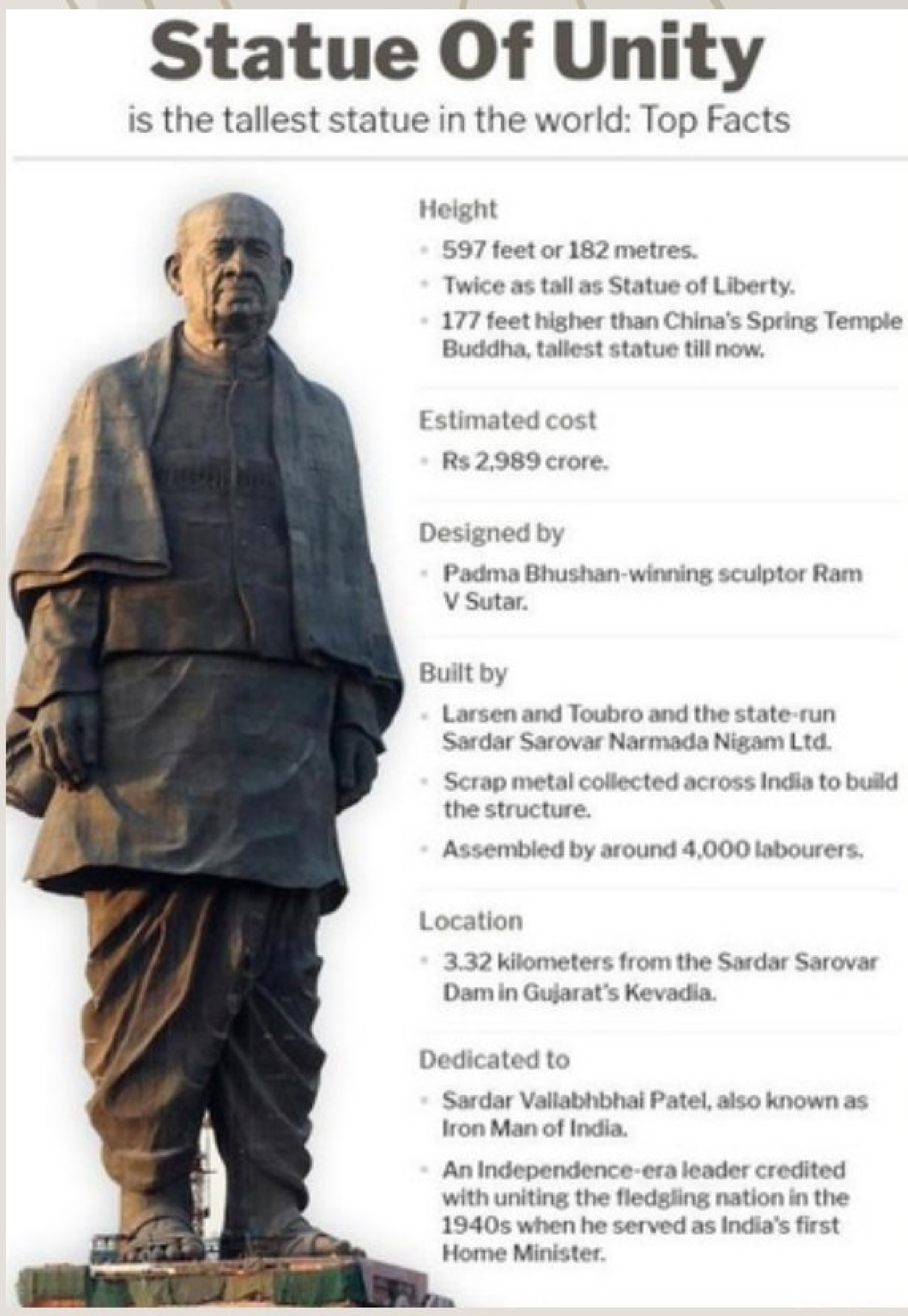



Figure 10

New technology of construction of earthquake resistant building includes the use of pendulum. Japanese engineers are using innovative technology consisting of quake damping pendulums on tall buildings to counter shaking due to temblors in skyscrapers. The anti-quake technology is based on the idea that heavy pendulums counter the ground moving action caused by an earthquake. When an earthquake - with long-period seismic motion - begins, it pushes the base of a tall building in the direction of the seismic activity - the top of the building is left motionless for a moment, which soon catches up, but by then, the bottom has moved back in the opposite direction. Such motions can cause tall buildings to sway violently resulting in damage or even destruction of the building, Phys.Org reported. In order to counter such motion in newly built skyscrapers, pendulums are installed on the upper floors. They work by automatically swaying counter to the motion created by the earthquake. The result is a reduction in swaying and hopefully, damage to the building and harm to its occupants. Two Japanese companies, Mitsui Fudosan and Kajima Corporation, plan to install quake damping pendulums atop the Shinjuku Mitsui Building in downtown Tokyo by

2015. The building was built before new quake dampening technology was developed for skyscrapers. Many of Tokyo's skyscrapers were built long before the new pendulum technology was developed, leaving them at risk when the next quake strikes, the report said. Engineers, in this new effort, have devised a means for adding pendulums to the tops of existing skyscrapers. The 55 story Shinjuku Mitsui Building - which was observed to sway approximately two meters during the 2009 Great East Japan Earthquake - will be outfitted with six such pendulums, each hung inside its own frame and weighing 300 tonnes.

### 1.5 OCCURRENCE

As we have seen, earthquakes are caused by the reshaping of Earth through the movement of Earth's tectonic plates. Most earthquakes occur along tectonic plate boundaries, along cracks in the lithosphere called faults, or along the mid-oceanic ridges but the majority of the seismic energy released in the world is from earthquakes occurring along the plate boundaries, particularly around the Pacific Rim or the so-called Ring of Fire where there is a particularly intense tectonic activity that causes Tsunamis on a regular basis.

Frequent earthquakes along the west coast of Chile and North America, Japan and Alaska is caused by this activity. This is also the cause of volcanic eruptions in the Andes mountains, the Philippines and northwest United States. The "Ring of Fire" accounts for about 90% of the world's earthquakes. The next most seismic region (5-6% of earthquakes) is the Alpide belt which slices through Europe and Asia (it extends from the Mediterranean region eastwards through Turkey, Iran, and northern India).Incremental plate movement is responsible for the most powerful earthquakes on Earth. The South American subduction zone created the largest known earthquake in 1960 which registered M9.5 off the coast of Chile.

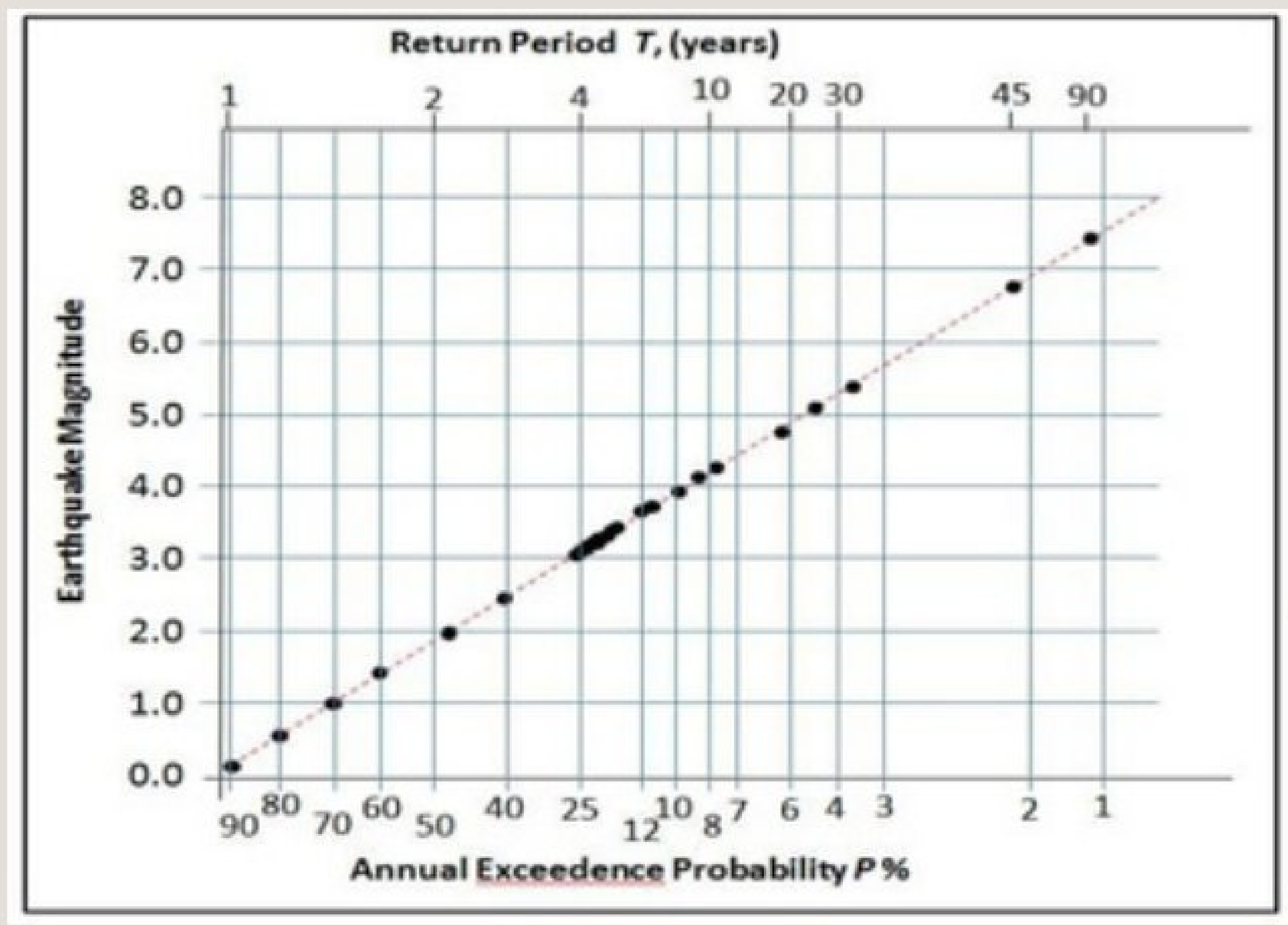
Scientists have found that the deepest earthquakes in the world occur in subduction zones at depths of about 450 miles (600-700 km). High temperatures at these depths make it hard to understand the mechanism by which earthquakes are generated. The rock is too warm and soft to cause earthquakes below this depth.

Earthquakes often occur in sequences. The main shock is the largest and principal event in a sequence.
This is preceded by the foreshocks and followed by aftershocks, which can last for up to ten years after the event. Caused by release of residual stress, in areas not ruptured in the main shock, aftershocks may not occur on the same fault as the main shock.


FIGURE 11

### 1.6 RETURN PERIOD OF EARTHQUAKE

Return period describes the expected (mean) time (usually in years) between the exceedance of a particular extreme threshold. Return period is traditionally used to express the frequency of occurrence of an event, although it is often misunderstood as being a probability of occurrence.




GRAPH 5

Return periods for Hindukash region

| Magnitude | Gumbel's method 1907-1976 (4.5) | (4.7) | (4.9) | * (4.5) | h≤60km (4.5) | h>60km (4.5) | 1962-1976 | Gutenberg-Richter's relationship 1907-1977 | h>60km | h<60km | 1962-1977 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5.0 | 1.11 | 1.09 | 1.07 | 1.10 | 1.61 | 1.47 | 1.34 | 0 25 | 0.56 | 1.28 | 0.12 |
| 5.5 | 1.43 | 1.39 | 1.35 | 1.42 | 2.55 | 2.05 | 2.07 | 0.54 | 1.10 | 2.46 | 0 39 |
| 6.0 | 2.16 | 2.11 | 2.05 | 2.13 | 4.44 | 3.08 | 3.72 | 1.16 | 2.16 | 4.73 | 1.29 |
| 6.5 | 3.61 | 3.58 | 3.55 | 3.56 | 8.13 | 4.88 | 7.21 | 2.50 | 4.22 | 9.07 | 4.29 |
| 7.0 | 6.45 | 6.53 | 6.61 | 6.37 | 15.33 | 7.96 | 14.57 | 5.37 | 8.26 | 17.43 | 14.20 |
| 7.5 | 11.92 | 12 34 | 12.81 | 11.80 | 29.34 | 13.23 | 30.03 | 11.56 | 16.17 | 33.47 | 47.06 |
| 8.0 | 22.44 | 23.79 | 25.32 | 22.29 | 56.62 | 22 24 | 62.48 | 24 85 | 31.66 | 64.27 | 155.91 |
| 8.5 | 42.68 | 46.31 | 50.56 | 42.52 | 109.70 | 37.63 | 130.61 | 53.43 | 61.99 | 123 43 | 516.55 |

Return periods for (a) Northeast India and (b) Andaman and Nicobar Islands

| Magnitude | Gumbel's method 1895-1976 | h>40km 1895-1976 | h<40km 1895-1976 | 1962-1976 | Gutenberg–Richter's method 1895-1977 | h>40km 1895-1977 | h<40km 1895-1977 |
|---|---|---|---|---|---|---|---|
| | | | (a) Northeast India | | | | |
| 5.0 | 1.65 | 3.26 | 1.76 | 1.82 | 0.53 | 3.30 | 7.22 |
| 5.5 | 2.44 | 6.71 | 2.71 | 3.13 | 1.14 | 4.70 | 12.04 |
| 6.0 | 3.90 | 14.57 | 4.46 | 5.93 | 2.45 | 6.86 | 20.08 |
| 6.5 | 6.50 | 32.40 | 7.67 | 11.77 | 5.27 | 9.89 | 33.41 |
| 7.0 | 11.15 | 72.85 | 13.52 | 23.93 | 11.33 | 14.25 | 55.85 |
| 7.5 | 19.40 | 164.58 | 24.15 | 49.24 | 24.36 | 20 54 | 93.14 |
| 8.0 | 34.07 | 372.64 | 43.47 | 101.89 | 52.40 | 29.61 | 155.34 |
| 8.5 | 60.12 | 844.52 | 78.58 | 211.43 | 112.68 | 42.69 | 259.08 |
| | | | (b) Andaman-Nicobar Islands | | | | |
| | 1914-1976 | 1914-1976 | 1914-1976 | 1962-1976 | 1914-1977 | 1914-1977 | 1914-1977 |
| 5.0 | 1.31 | 3.07 | 1.40 | 1.60 | 0.43 | 1.90 | 3.91 |
| 5.5 | 2.01 | 6.13 | 2.21 | 3.16 | 1.01 | 3 07 | 11.49 |
| 6.0 | 3.56 | 12.95 | 3.97 | 7.28 | 2.38 | 4.96 | 14.35 |
| 6.5 | 6.86 | 28.09 | 7.69 | 17.92 | 5.56 | 8.01 | 27.48 |
| 7.0 | 13.76 | 61.65 | 15.43 | 45.36 | 13.02 | 12.92 | 52.63 |
| 7.5 | 28.21 | 136.06 | 31.56 | 116.02 | 30.49 | 20.86 | 100.79 |
| 8.0 | 58.42 | 301.01 | 65.10 | 297.98 | 71.41 | 33.68 | 193.03 |
| 8.5 | 121.56 | 666.66 | 134.87 | 766.57 | 167.21 | 54.36 | 369.69 |

Return periods for (a) Kashmir and Himachal Pradesh, (b) India-western Nepal border and (c) Nepal India-Sikkim border

| Magnitude | Region B Gumbel's method 1905-1976 | 1962-1976 | G-R method 1905-1977 | Region C Gumbel's method 1914 1976 | 1962-1976 | G-R method 1914-1977 | Region D Gumbel's method 1934-1976 | 1962-1976 | G-R method 1934-197 |
|---|---|---|---|---|---|---|---|---|---|
| 5.0 | 2.72 | 3.09 | 4.63 | 2.78 | 2.51 | 2.37 | 2.44 | 2.92 | 3.5 |
| 5.5 | 5.15 | 8.32 | 8.03 | 5.34 | 5.76 | 4.75 | 4.49 | 7.18 | 5.1 |
| 6.0 | 10.37 | 24.38 | 13.94 | 10.88 | 14.49 | 9.53 | 8.82 | 19.16 | 7.3 |
| 6.5 | 21.48 | 73.54 | 24.20 | 22.79 | 37.80 | 19.12 | 17.92 | 52.71 | 10.7 |
| 7.0 | 45.14 | 223.87 | 42.00 | 48.41 | 99.99 | 38.36 | 36.96 | 146.60 | 15.4 |
| 7.5 | 95.49 | 683.64 | 72.90 | 103.47 | 265.84 | 76.96 | 76.85 | 409.39 | 22.4 |
| 8.0 | 202.63 | 2089.84 | 126.53 | 221.83 | 708.20 | 154.41 | 160.39 | 1144.89 | 32.4 |
| 8.5 | 430.62 | – | 219.61 | 476.25 | -- | 309.81 | 335.33 | – | 47.0 |

TABLE 6

**1.7 CONCLUSION**

Natural disaster is of serious concern in the Construction field. Earthquake don't kill people but buildings do . To resist Earthquake's effect, complex design procedure is used not only in the foundation as a base isolation but also in the whole structure with protective elements of earthquake. Using different analysis methods very large and complex buildings can be modelled. The vibration of tall buildings with symmetrical or asymmetrical configuration is simulated for both harmonic loadings and real earthquake loadings. TMD (tuned mass damper) is best for gently damped structure, and its viability diminishes as with increment in auxiliary damping. TMD is more powerful for long term seismic tremor ground movements. TMD is best when the basic recurrence is near the focal recurrence of ground movement.

The mass asymmetrical tall building suffers more damages than the corresponding symmetrical buildings. It shows that the asymmetrical building is less seismic resistant than a symmetrical building during an earthquake. If the damping is underestimated and the stiffness is overestimated then the assumption about higher buildings on an undone soil structure interaction rigid base does not represent the earthquake response.

A destructive cyclone leads to huge storm surge and high speed wind gusts. Under these actions buildings designed incorrectly will not perform well and surrenders. The paper summarizes the construction technique and design principles for building elements like roofs, doors and windows, foundation and walls to minimize the structural damage.

Flood resistant buildings are typically constructed using concrete or steel and concrete but may also be made with masonry provided there is an impervious layer, such as water-resistant render or asphalt. Typically, frame buildings are more difficult to make flood resistant without a concrete or masonry layer due to the number of potential pathways for water around junctions. Masonry is generally permeable, as is concrete unless to a certain specification. Therefore, water can seep through walls and floors unless designed properly. Cavity walls may need to be filled with water resistant insulation below the flood level to prevent the passage of water and to prevent contamination within the cavity.

For fire resistant the strength of the reinforced concrete frame structure under the high temperature decreased obviously. The ultimate load of the frame structure decreased 36.9% under 600℃; under 800℃, decreased 48%; under 1000℃, the frame structure almost lost its bearing capacity, it decreased 57.3% . The resistance of buildings and other facilities to fire depends on the extent to which their steel structures soften when heated to the temperatures created by the fire. A steel is generally considered fire-resistant if its strength when heated to such temperatures for short periods of time remains equal to 0.6–0.7 of its strength at room temperature. The alloying system Cr-Mo-V-Nb can be used for steels that are designed to be fire-resistant up to 700° C. The greatest resistance to fire — up to 800°C — is obtained in steels that contain boron.Plate Tectonics and the Ring of Fire

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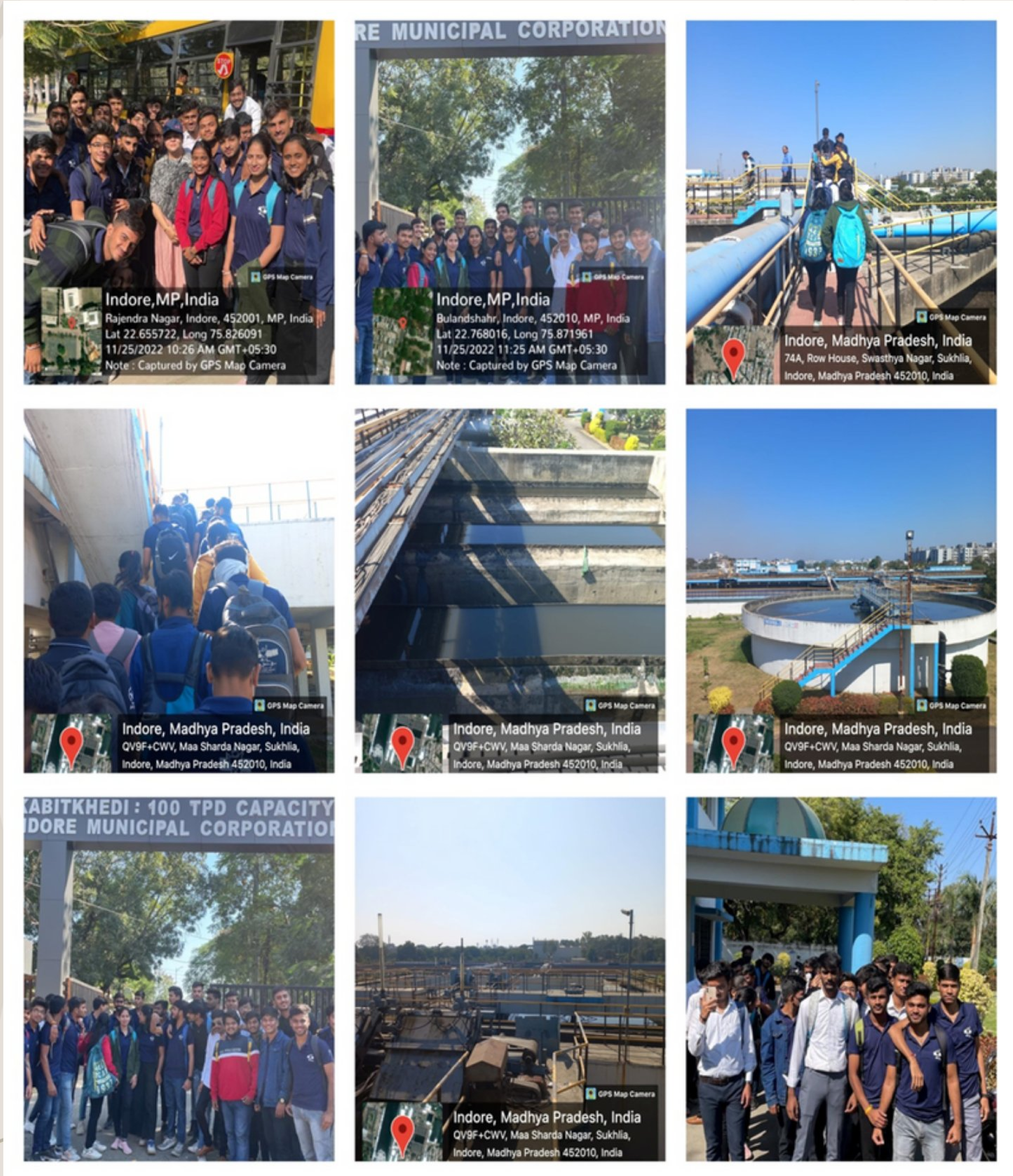
Plate Tectonics and the Ring of Firehttps://education.nationalgeographic.or g/res ource/plate-tectonics-ring-fire/

# EVENTS ORGANIZED BY CIVILIPSA

## Some glimpses of Trip to Kabitkhedi



# INTERACTIVE SESSION ON RECENT RESEARCH OPPORTUNITIES IN GEO-ENVIRONMENTAL ENGINEERING AT IPS ACADEMY

Recently, an interactive session on "Recent Research Opportunities in Geo-Environmental Engineering" was organized Civil Engineering Department of IPS Academy, Institute of Engineering and Science under the aegis of the Indian Geotechnical Society, IPSA IES student chapter Indore


**Faculties from Civil & Chemical Engineering background attended the programme.**


Dr. Krishna R. Reddy, University Scholar, Distinguished Researcher & Professor of Civil & Environmental Engineering, University of Illinois at Chicago USA was the Expert. The session was highly interactive and received an overwhelming response from the faculties and students. Dr. Reddy discussed research culture at University of Illinois and possibility for faculties to do research in collaboration with University of Illinios, Chicago, USA.The professor told that the reason for the Joshimath tragedy is the mindless construction on the mountains and ignoring the
geological and ecological vulnerabilities. Also discussed the current topics of geo-environmental research.

Dr. Reddy also discussed with Principal Dr. Archana Keerti Chowdhary regarding possibility of dual degree program (B.Tech and M.Tech) with IPS Academy, Institute of Engineering & Science and University of Illinois at Chicago USA .
Institute head Dr. Archana Kirti Chowdhary told that the Civil Engineering Department of the institute is the only department in the state where youth are given the opportunity to do research with global cooperation. So that young engineers can assess the changes taking place in geo-environmental engineering in this modern era at the global level and disasters like Uttarakhand can be avoided. Chairman Mr. Achal Choudhary said that this is the need of the day.

Dr. Meghna Sharma from IIT Indore was also present in the session. Dr. Neelima Satyam coordinated the event. The welcome speech was expressed by the Head of the Department, Dr. Amit Sharma and thanks were expressed by Prof. Vijay Baradiya and Dr. Mohd. Naseem.

# "AICTE SPONSORED TWO DAY'S MODROBS TRAININGPROGRAM"
# (19TH -20TH JAN,2023)

# SAMEEKSHA 2023

CIVILIPSA organizes its annual quiz event —SAMEEKSHA in the month of September since last nine years. Sameeksha tests the normal intelligentsia and knowledge in general civil engineering. The quiz is conducted for teams comprising of two members each. There is no limit to the number of teams from one college



CIVILIPSA'S
SAMEEKSHA
IPS ACADEMY
Institute of Engineering
& Science
Civil Engineering Department
GSAT

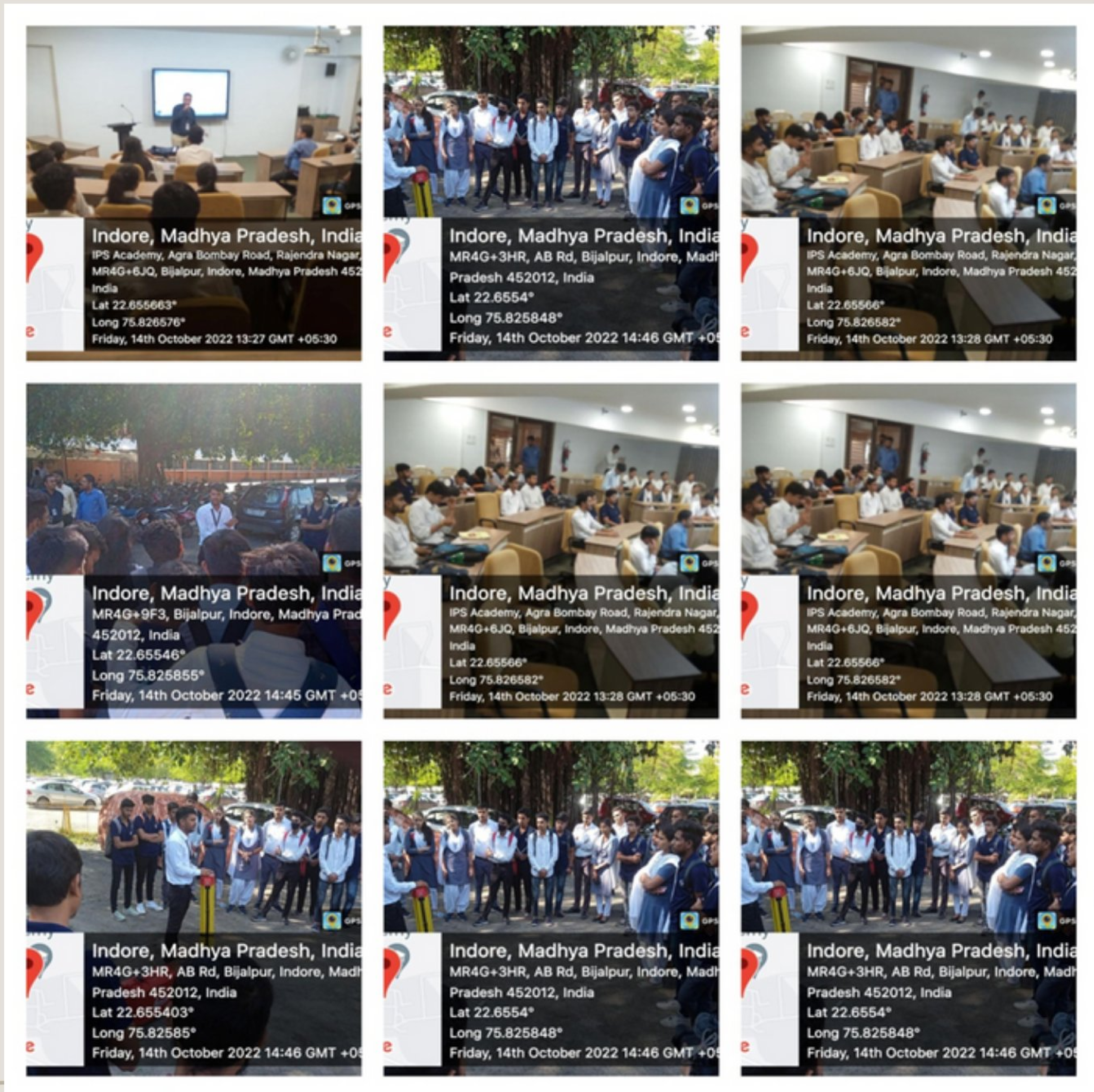

TEAM 2
IPS ACADEMY
INDORE
GSAT


IPS Academy
CIVILIPSA
Knowledge Skill Values

# SRUJAN 2022

CIVILIPSA organizes its annual event —SRUJAN, two days National Seminar on various themes in the first week of October every year. The seminar is symphony of various events including Expert lectures, Panel Discussion, Paper presentation, Technical Hunt , Conundrum Model making, Bridge IT& various on the spot events.

—SRUJAN aims to bring mutually professionals, architects, engineers, academicians, research scholars and students on a widespread dais and have interactive brain storming sessions and thereby attempts to be made for overlay technique to innovation with economy, quality and safety in the field of Civil Engineering



# NEEV 2023

CIVILIPSA is organizing its annual event —NEEV‖, National Level Student's Paper Presentation.
—NEEV aims to stimulate the spirit of inventiveness & managerial skill among students and to encourage innovative thoughts, creativity, exploration, technological & presentation skills and also to expand the decision-making skills among the students so that the creative talent of individuals could be harnessedfor the benefit of the nation.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# STUDENT CULTURAL EVENTS


## FACE ART



FREEDOM
IS NOT GIVEN
IT IS TAKEN


आज़ादी का अमृत महोत्सव
सत्यमेव जयते
"TUM MUJHE KHOON DO MAIN TUMHE AZAADI DUNGA"
"SEVEN SINS"
"JAI JAW
JAI KISAA
WE, THE PEOPLE OF INDIA HAVING SOLEMNLY RESOLVED TO CONSTITUTE INDIA INTO SOVEREIGN SOCIALIST SECULAR DEMOCRATIC REPUBLIC,
TO ALL ITS CITIZENS

# SOME GLIMPSES OF AICTE INTERNSHIP-JULY 2022

Ministry of Housing and Urban Affairs
Government of India

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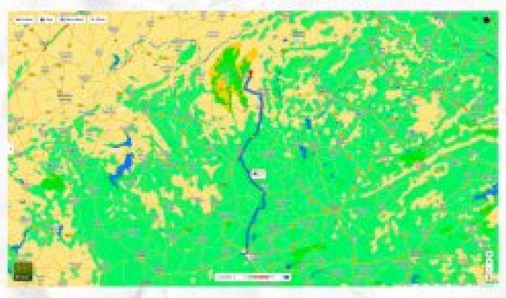
# LOCATION OF BAIRAD TALAB

BAIRAD TALAB (TEAM B)
SHIVPURI (M.P.)

## ABOUT THE BAIRAD TALAB

The Bairad Talab is situated in **Shivpuri** also known as **Beauty of Bairad** It is surrounded by **Gol Pahadiya Temple** Bairaj Temple (North) and Hanuman Mandir Bairad is a Village in **Pohri** Tehsil in **Shivpuri** District of Madhya Pradesh State, India It belongs to **Gwalior Division** It is located 44 Km towards North from District headquarters Shivpuri. 15 Km from Pohri 318 Km from State capital **Bhopal**

| | |
|---|---|
| **Bairad** | : Village Overview |
| **Block / Tehsil** | : Pohri |
| **District** | : Shivpuri |
| **State** | : Madhya Pradesh |
| **Pincode** | : 451151 |
| **Area** | : 1296.6 Hectares |
| **Population** | : 4,098 (Census 2011) |
| **Households** | : 816 |
| **Nearest Town** | : Shivpuri (57 Km) |



Route To Bairad Talab
From State Capital Bhopal (350 Km)

Inlet to the Bairad Talab from Anandpur Village

Outlet of Bairad Talab to Naya Pura

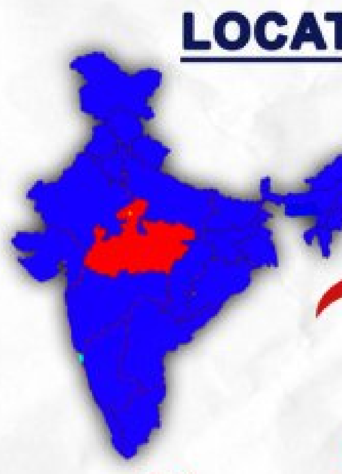


Fig. 1
REPRESENTATION OF BAIRAD ON STATE MAP OF INDIA

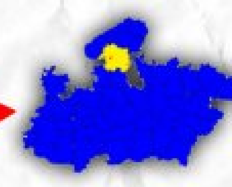
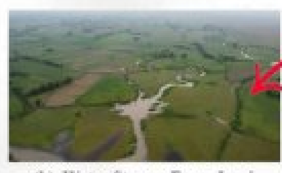


Fig. 2
REPRESENTATION OF BAIRAD ON DIST. MAP OF M.P.

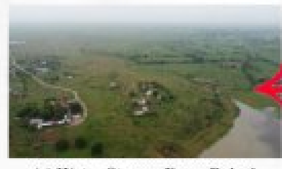
Fig. 3
VISUAL REPRESENTATION WITH AUTOCAD DRAWING.

LOCATION OF BAIRAD TALAB

(a). Water Stream From Bateshwar Temple Side

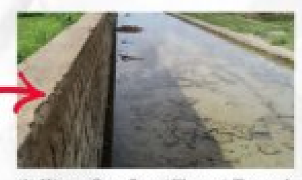


(b). Water Stream From Jorai

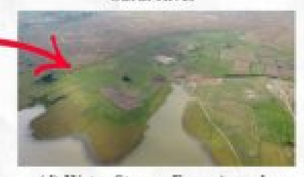


(c).Water Stream From Bairaj Temple Side

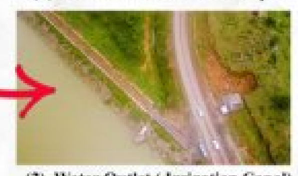

Geo-coordinates of Bairad Talab
(25°4310.07"N, 77°27'49.40"E)



(1).Water Overflow (Charar) Towards Surai River



(d).Water Stream From Anandpur



(2). Water Outlet ( Irrigation Canal) Towards Naya Gaon

INLET AND OUTLET LOCATION OF BAIRAD TALAB

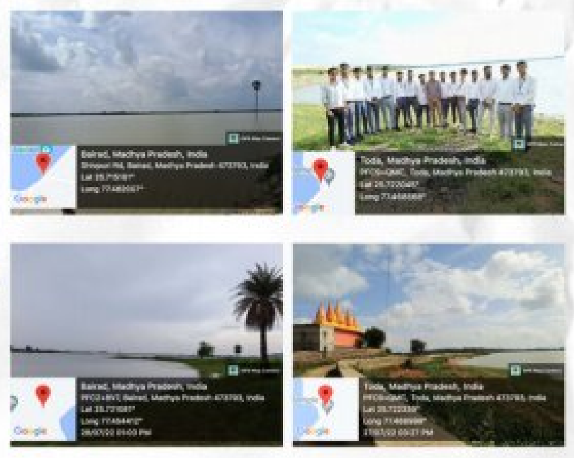
## SPECIFICATION OF BAIRAD TALAB

| | |
|---|---|
| **Size of Bairad Talab** | : 2370 m² |
| **Extent** | : 2000 m of the Radius |
| **Preimeter** | :16170 m |
| **Water Holding Cap.** | : $1659 \times 10^4$ m³ (Avg.depth 7m) |
| **Major Inlet of WB** | : Toda Village |
| **Major Outlet of WB** | : Naya Pura |

## INLET & OUTLET DETAILS

**Inlets**- There are four major inlets namely (a),(b),(c) and (d) in the Biarad Talab.which are Bairaj TempleSide, Bateshwar Mahakal Temple side and the village Anandpur and one from the village Bairad respectively.

**Outlets**- There are two major outlets namely 1 and 2.These outlets direct towards Naya Pura side for irrigation purpose and overflow to the Toda Side.



GEO-TAGGED IMAGES OF THE BAIRAD TALAB

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# PHOTOGRAMMETRIC SURVEY

BAIRAD TALAB (TEAM B)
SHIVPURI (M.P.)

## PHOTOGRAMMETRIC SURVEY

Photogrammetry method is used to obtain accurate and reliable data of Bairad Talab for mapping purposes. This included capturing the multiple images of the and Talab. then combined this multiple images captured by aerial photography by Drone to create a map an area of interest (AOI).

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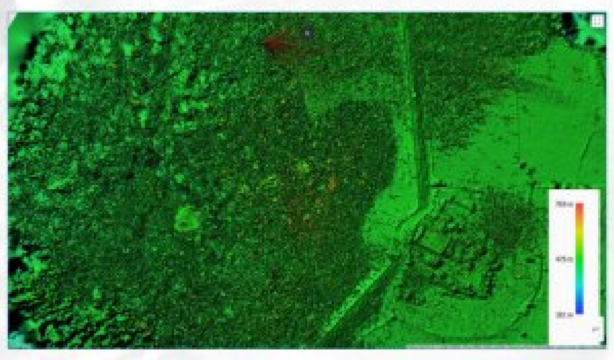
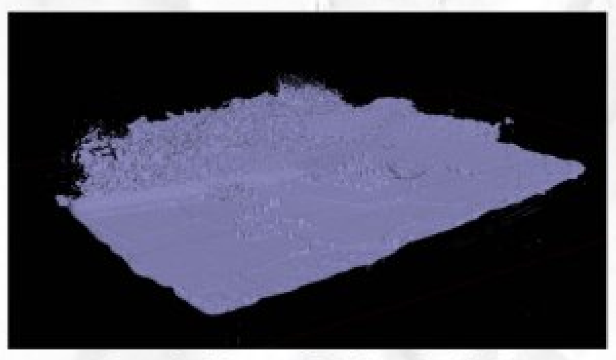
Image capturing Via Drone

Data Processing Via Metashape Pro



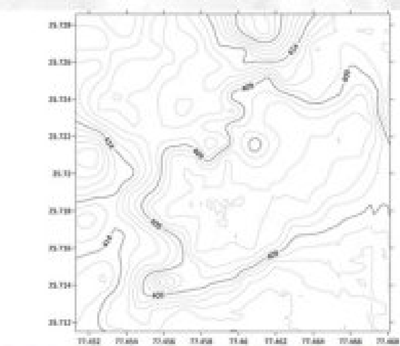
DEM of Bairad Talab
Showing natural features of WB



Depth Map of Bairad Talab
Representing distance info.

3D Model of Bairad Talab
Three-Dimensional virtual representation of WB

Orthomosaic Map of Bairad Talab



Contour Line Map of Bairad Talab

3D/ Texture Map of Bairad Talab

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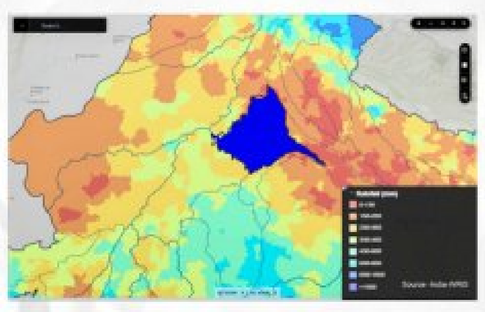
# HYDROLOGY OF BAIRAD TALAB

BAIRAD TALAB (TEAM B)
SHIVPURI (M.P.)

## HYDRO METEOROLOGICAL DATA



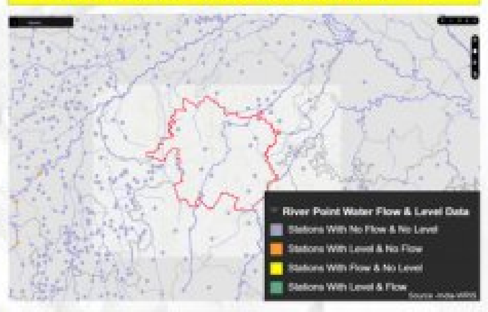
Rainfall Map of the Yamuna Lower Basin

### CUMULATIVE RAINFALL INFORMATION

As we can clearly see in the above image Shivpuri lies in the range of 150-250 mm rainfall.

This is the Cumulative Rainfall Information of Shivpurifrom 01-Jun-2022 to 19-Jul-2022 using IMD.

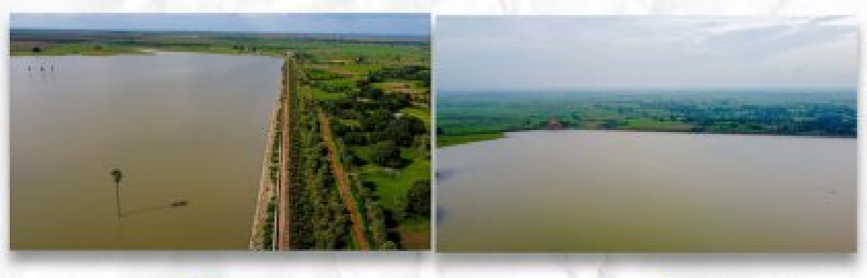
## SURFACE WATER DETAILS




Surface Water Flow Map of Shivpuri District

### DIRECTION OF FLOW OF THE WATER

The direction of flow of water from the Bairad Talab is in South West such that outlet of the water is usedfor the irrigation purpose to the Naya Pura The water of the Bairad Talab is lifeline to the near by villages .The overflow water further flows towards the Surai River.



REJUVENATE OF BAIRAD TALAB

### ENCOURAGEMENT TO THE FISH CULTIVATION

Water quality management in aquaculture is vital, The water quality can me sustaines therefore it is imortant to cultivate fishes in the water body and to maintain optimum oxygen and pH,

### CLEANING AND SUPERVISION REQUIRED

In order to rejuvenate the water body we must maintain the cleanliness in and around the Bairad Talab,this includs removal of all the harmful waste from the water body

### PLANTATION OF TREES

For better health of water body we should plant trees around the periphery of the talab.This will provide a better ecosystem for all the life forms in the area.

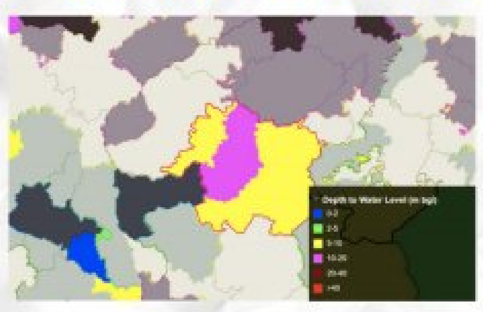
### DEVELOPMENT OF CATCHMENT AREA

It is very important to maintain and increasement of the catchment area beasuse it insures that the water holding capacity and also has vital role in the ground water level.

### IDOL IMMERSION TANKS

A seprate tanke must be built dor religious / cultural fetivitis that requires immersion into the water body. Eg. Ganesh Visarjan.

## GROUND WATER DETAILS

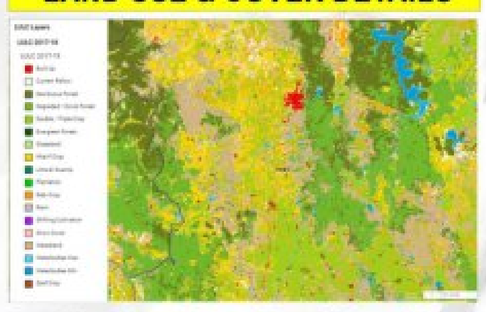


Ground Water Level (m) map of Shivpuri District

### Seasonal Ground Water information

the seasonal ground water inforamtion extract from India-WRIS of duration 1-Dec 2002 to 1-Dec 2018 using State and Central Station gauge.
- Rising trend range (0.13 to 0.17m/yr)
- Declining trend range (0.08 to 0.88 m/yr)

## LAND USE & COVER DETAILS



Land Use & Land Cover Map of Shivpuri District

### LAND USE & LAND COVER

The near by land of Bairad Talab is mostly the agricultural land which is majorly used to cultivate Rabi Crop.

The area of Bairad Talab,Shivpuri is mostly covered with sandy clay soil and southern part of the district is covered with black cotton soil.
Depth of soil -15m.
Colour of soil - Light yellow to yellowish brown.

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# NAGAR PARISHAD AND TEHSIL VISIT OF BAIRAD

BAIRAD TALAB (TEAM B)
SHIVPURI (M.P.)







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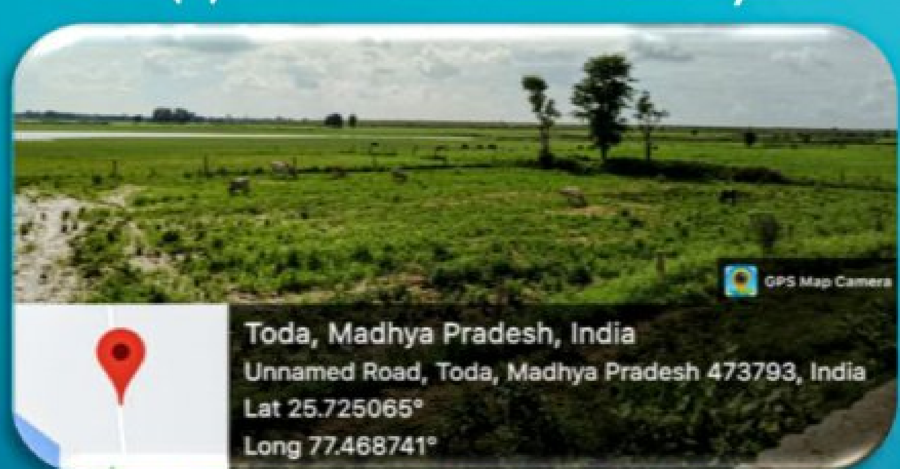
# METHODS TO REJUVENATE THE WATERBODY

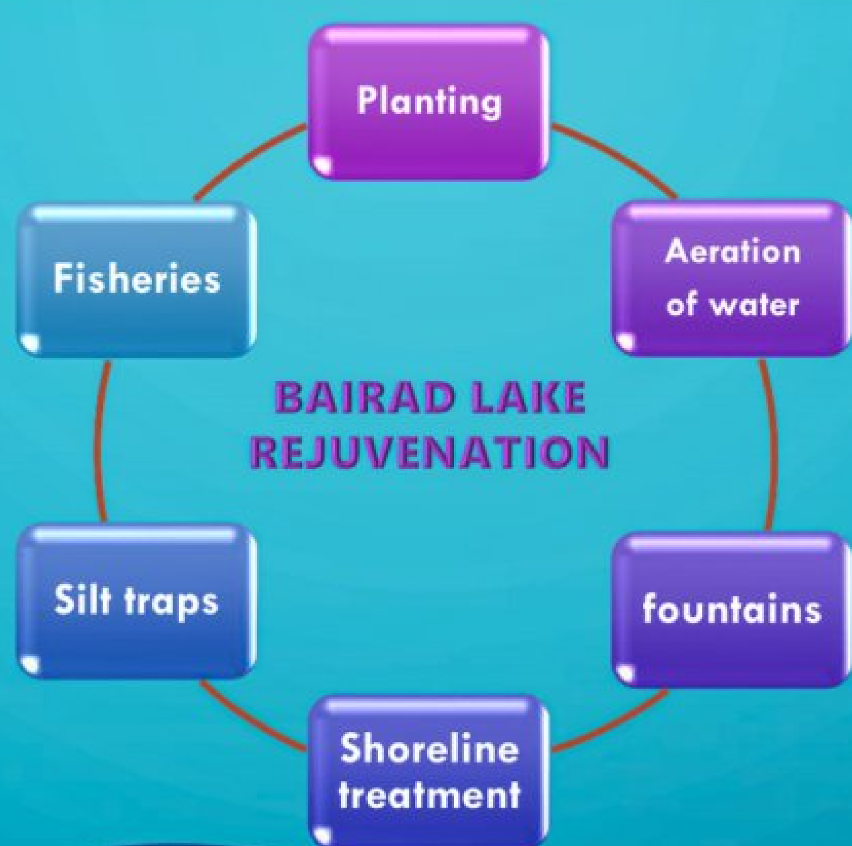
BAIRAD TALAB(TEAM B),
SHIVPURI (M.P.)

(a) Plantation near waterbody




(b) Treatment of watershed area


(c) Cleaning required in the existing waterbody




**METHODS FOR REJUVINATION:**

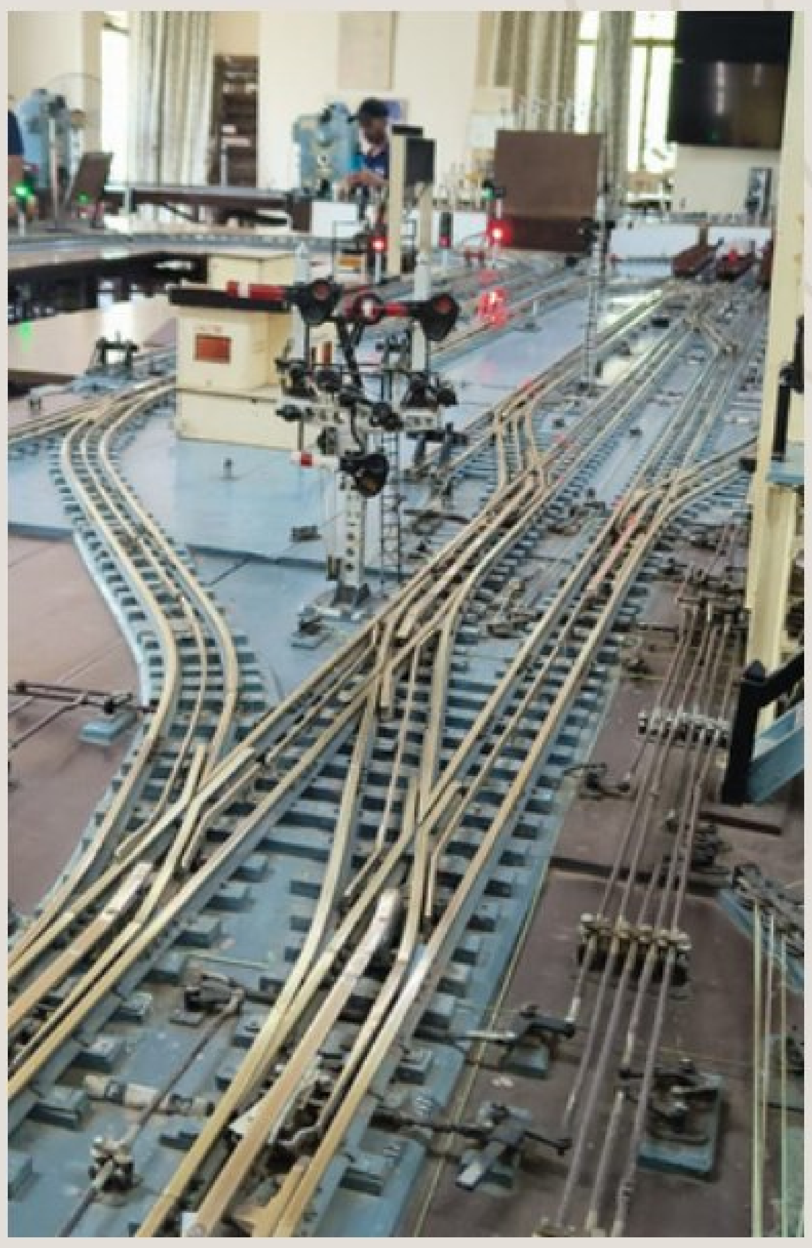
- → Afforestation with native species.
- → Cleaning the lake with proper technology.
- → Aeration of water for better health of the Bairad Talab.
- → Construction of fountains for aeration.
- → Regular chemical testing of the water body for irrigation benefits.
- → Awareness in the natives of the lake.

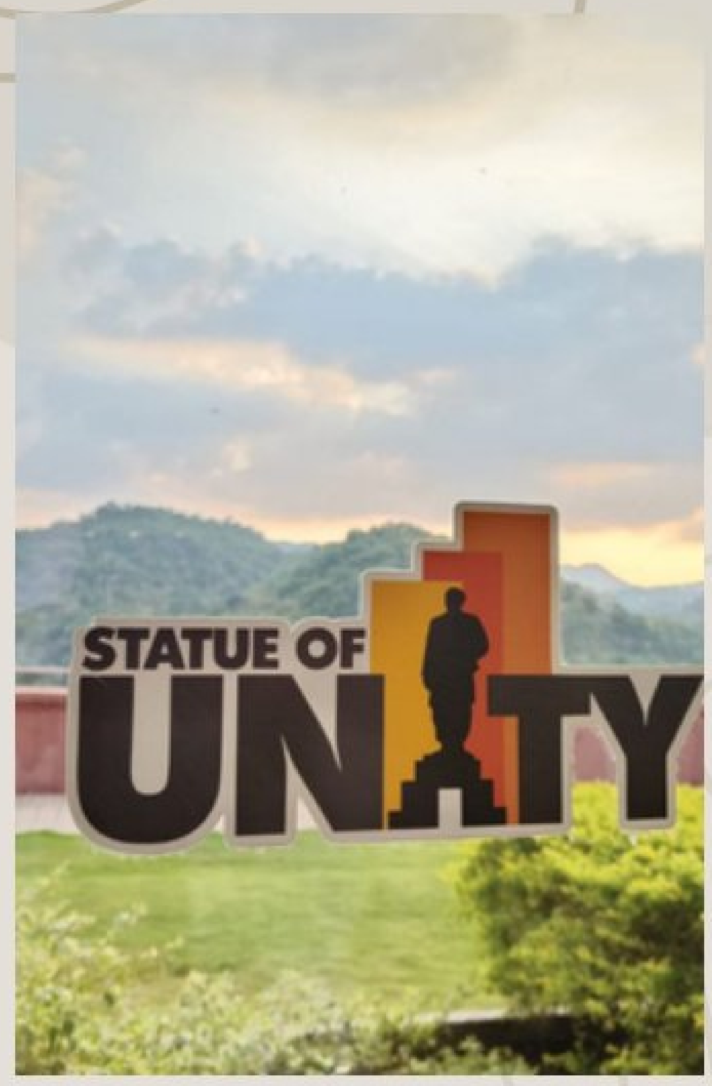
(d) Fisheries for better health of WB

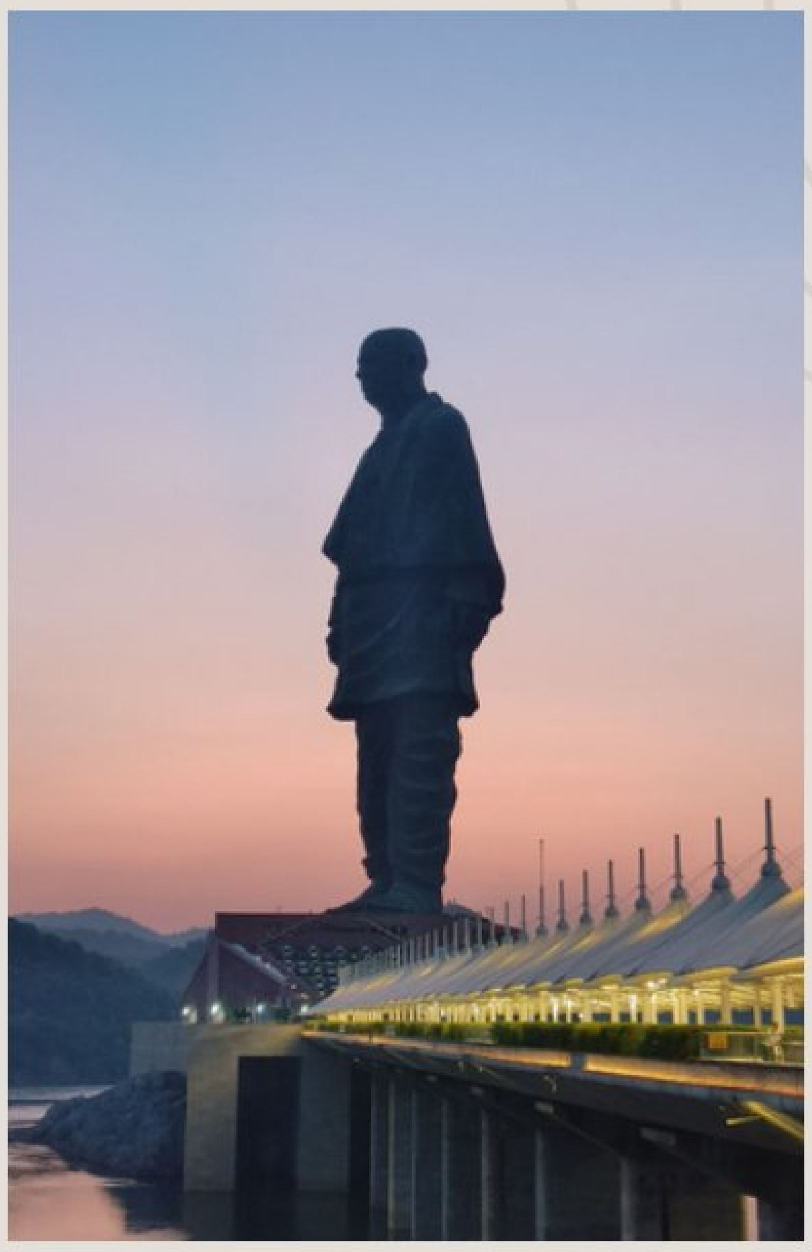

(d) Increasing public awareness

(e) Construction of fountain for aeration

**AS PER THE REQUIREMENT OF CURRICULUM, STUDENTS OF B.TECH CIVIL ENGINEERING, FROM IPS ACADEMY INSTITUTE OF ENGINEERING AND SCIENCE,(A UGC AUTONOMOUS INSTITUTE) INDORE, VISITED SARDAR SAROVAR DAM, RAILWAY STAFF COLLEGE AND STATUE OF UNITY AT GUJARAT IN THEIR INDUSTRIAL TOUR DURING 29TH SEPTEMBER - 2ND OCTOBER 2022.**



Scanned with OKEN Scanner

# EARTHQUAKE AWARENESS PROGRAMS

## आईपीएस एकेडमी में भूकंप जागरूकता प्रशिक्षण कार्यक्रम

**राजीव टाइम्स ▪ इंदौर**

आईपीएस एकेडमी, इंस्टीट्यूट ऑफ इंजीनियरिंग एंड साइंस के सिविल इंजीनियरिंग विभाग द्वारा एआईसीटीई मॉडरोब्स द्वारा प्रायोजित भूकंप अभ्यास एवं मूल्यांकन विषय पर प्रशिक्षण कार्यक्रम का आयोजन किया गया। कार्यक्रम में सिविल इंजीनियरिंग पृष्ठभूमि से संबंधित लगभग 60 प्रतिभागियों ने प्रशिक्षण प्राप्त किया। प्रशिक्षण कार्यक्रम का मुख्य उद्देश्य युवा व पेशेवर सिविल इंजीनियर्स को भूकंप जैसी आपदाओं का इमारतों पर आकलन व उचित समाधान बताना था। शासकीय इंजीनियरिंग कॉलेज मोदासा गुजरात के अप्लाइड मैकेनिक्स विभाग के विभागाध्यक्ष मेजर डॉ. सीएस संघवी व गुजरात टेक्नीकल यूनिवर्सिटी के प्रो. गिरीशचंद्र मोधा उपस्थित हुए। संस्था प्रमुख डॉ. अर्चना कीर्ति चौधरी ने बताया संस्था का सिविल इंजीनियरिंग विभाग प्रदेश का एकमात्र विभाग है जहां इमारतों पर भूकंप संबंधित आकलन के लिए प्रयोगशाला स्थापित की जा रही है। अध्यक्ष अचल चौधरी ने कहा ये आज की आवश्यकता है तथा इस प्रयोगशाला को एआईसीटीई मॉडरोब्स से फंडिंग प्राप्त हुई है। मेजर डॉ. सीएस संघवी द्वारा भूकंप की जटिलताओं व समाज में उसके नकारात्मक प्रभाव पर प्रकाश डाला गया। उन्होंने यह भी कहा कि भूकंप व सुनामी जैसी विध्वंसकारी आपदाओं से पार पाने के लिए सिविल इंजीनियर्स का सबसे महत्वपूर्ण योगदान रहता है।

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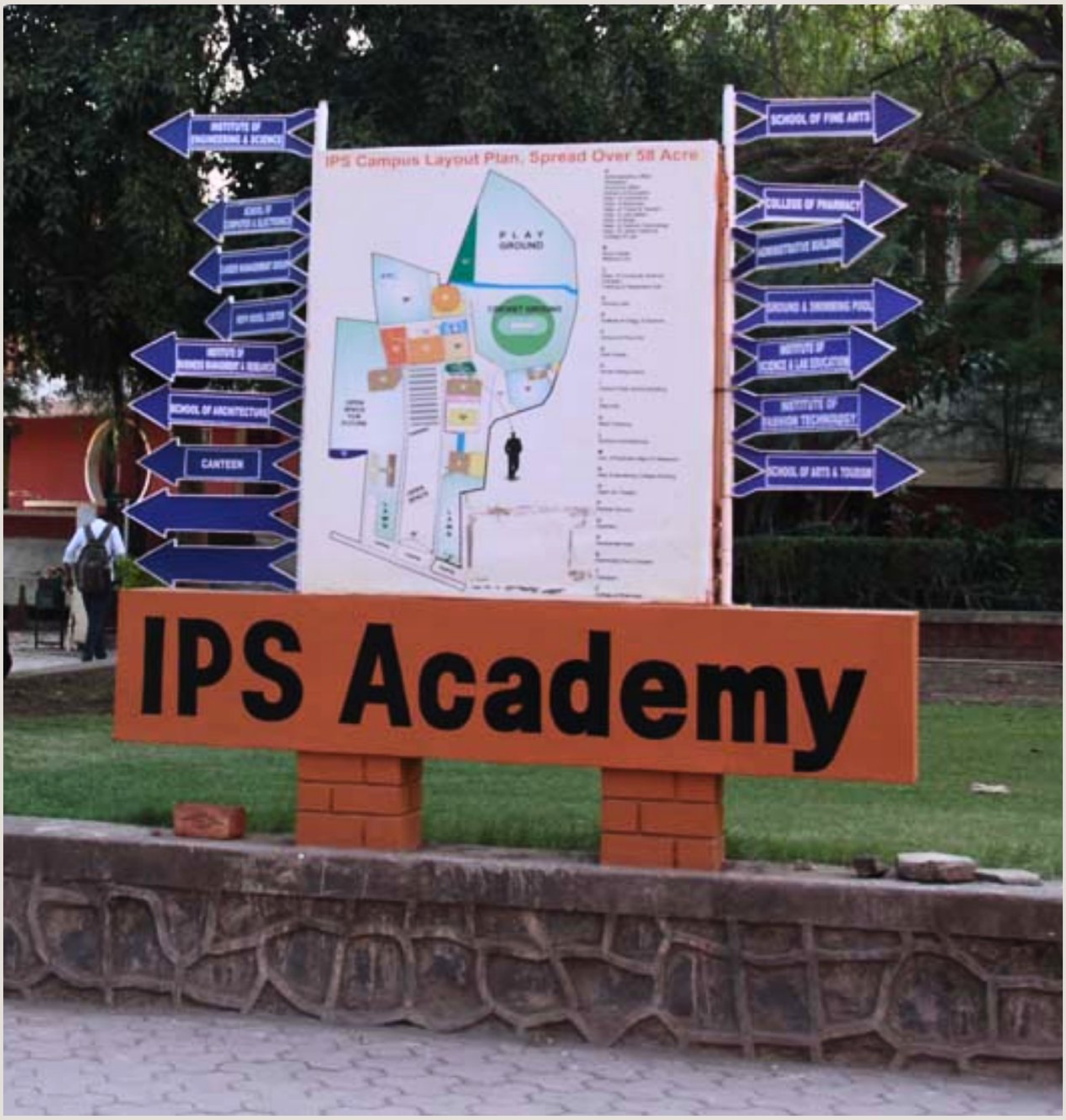


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