Taameer

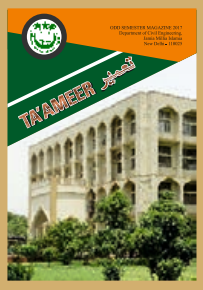
تعمیر

Magazine

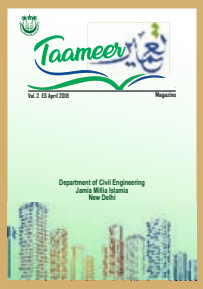
Volume 3, OS II - 2019

Department of Civil Engineering
Jamia Millia Islamia
New Delhi

Volume 3, OS II - 2019



Vol 1, OS I 2017



Vol 2, ES I 2018

Ta'meer Magazine is published two times a year by the department of civil engineering, Jamia Millia Islamia, New Delhi - 110025
Inquiries should be addressed to the Editor Phone: 011-26985227;
or e-mail: nazrulislam.jmi@gmail.com

Ta'ameer

Odd Semester Magazine

Features

In This Issue

VISION AND MISSION

VISION

To emerge as center of excellence for education and research in civil engineering and to produce professionally competent and ethically sound engineers of global standards, ready to serve the community and the nation with dedication.

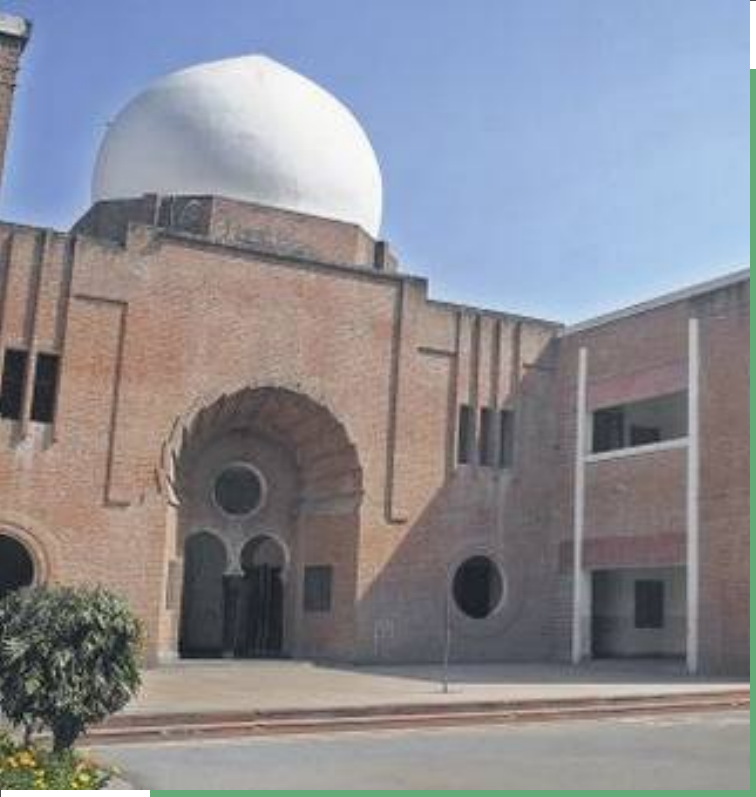
MISSION

M.1 To provide rigorous hands on civil engineering education through learner centric teaching pedagogy

M.2 Establish state-of-the art facilities for teaching and research in civil engineering domain

M.3 Motivate students to develop low-cost, sustainable, and ethical solutions to problems faced by the society

M.4 Provide opportunities to students to enable them to develop leadership and interpersonal skills



Jamia senior secondary school, Jamia Millia Islamia

Jamia Millia Islamia

Jamia Millia Islamia, an institution originally established at Aligarh in United Provinces, India in 1920 became a Central University by an act of the Indian Parliament in 1988. In Urdu language, Jamia means 'University', and Millia means 'National'

Jamia Millia Islamia, a Central Government funded University shall be celebrating its 100 years of establishment in year 2020. The University offers integrated education from Nursery to Research in specialized areas. At present, there are 39 departments and 22 centres of studies, offering more than 100 UG and PG programs. The University has more than 23 thousand bonafide students. The University has been ranked 12th amongst universities in India as per MHRD's* NIRF** India ranking 2018. (jmi.ac.in)

FTK-Centre for Information Technology

Department of Civil Engineering

The **Department of Civil Engineering** (DCE) offers two undergraduate courses in Civil Engineering and Master's program with specializations in Environmental Engineering and Earthquake Engineering. More than 80 Ph. D. scholars including foreign students from different countries are currently working in the Department on emerging research areas. DCE also renders technical advice to various Government and Private Sector companies on consultancy basis.

DCE has many collaboration programs with foreign universities including University of Applied Sciences, Erfurt, Germany; Wessex Institute, UK; University of Waterloo, Canada; Asian Institute of Technology, Bangkok. DCE regularly organizes international and national conferences, seminars and workshops on current themes. This international conference is a sequel to the earlier conferences held on the themes of sustainability and development and is an endeavor of the DCE to focus on the emerging areas of smart city development. (https://www.jmi.ac.in/civil)

Prof. Gauhar Mahmood
Head
Department of
Civil Engineering

From the HoD.'s Desk

I congratulate the students of civil engineering department who have taken the initiative and have contributed to this edition of the department magazine.
While the area that civil engineering deals with is a vibrant one and keeps reinventing itself in fruitful ways over the years, it is necessary for us from time to time, to articulate our thoughts and to re-discover that the field is and what its relevance is. In some way, this magazine contributes to fulfilling this need.

Dr. Mehtab Alam Professor
Dean F/o Engg. & Tech.

Prof. Gauhar Mehmood
Head of Department

Dr. Khalid Moin
Professor

Dr. Mohammad Shakeel
Professor

Dr. Shamshad Ahmad
Professor

Dr. Farhan Ahmad Kidwai
Professor

Dr. Nazrul Islam
Professor

Dr. Quamrul Hassan
Professor

Dr. Mohammad Sharif
Professor

Dr. Sirajuddin Ahmed
Professor

Dr. Syed Mohammad Abbas
Professor

Dr. Asif Husain
Professor

Prof. Kafeel Ahmad
Research Director

Dr. Naved Ahsan
Professor

Mr. Ziauddin Ahmad
Associate Professor

Dr. Sayed M. Muddassir
Associate Professor

Dr. Azhar Husain
Associate Professor

Dr. Akil Ahmad
Assistant Professor

Dr. Syed Shakeel Afsar
Assistant Professor

Dr. Abid Ali Khan
Assistant Professor

Dr. Mohd. Umair
Assistant Professor

Mr. Ibadur Rahman
Assistant Professor

Dr. Md. Imteyaz Ansari
Assistant Professor
(Contractual)

Mr. Mohammad Tabrez Ali
Assistant Professor
(Contractual)

Mr. Mohd. Izharuddin Ansari
Assistant Professor
(Contractual)

EFFECT OF DIFFERENT POSITIONS OF SHEAR WALL IN A BUILDING FOR STRUCTURAL STABILIITY

Saba Rahman
Department of civil engineering
E-mail:saba.rahman@outlook.com
Under Guidance of
Prof. Khalid Moin

ABSTRACT

In the present work G + 10 multi Storey building is analyzed by using shear wall at different positions. Shear wall give structural stability to a building against earthquake forces. The structure is analyzed and results for different models of structure are evaluated.
Keywords: Seismic analysis, Shear wall, Story drift, STAAD Pro

Earthquake is the natural calamity, it produces strong ground motions which affect the structure. To protect the structure from earthquake shear walls are installed, it enhances the lateral stiffness, ductility, minimum lateral displacements and safety of the structure. Storey drift and lateral displacements are the critical issues in seismic design of buildings. Different types of frame models are developed and analyzed by static non-linear analysis by STAADPro. Shear walls are RC walls that are projected along the structure from base thus acting as a cantilever. Shear walls reduce the Storey displacement when seismic forces counter the building and avoid the total collapse of the building. In this investigation we will study on the different position of shear wall and its effect on the displacement and storey drift.

INTRODUCTION

Now-a-days multistoried buildings are rapidly constructed everywhere in the world and they are more slender and more sway than earlier buildings. The deformation of tall structures is composed of axial, bending, torsion, transverse shear. In recent period many new concepts and methods are adopted in field of seismic design. In general, RCC structures are constructed to control the lateral displacement.

Shear walls are most common structural system which provides lateral stiffness and stability against the lateral loads. Shear wall system is most significantly used for tall structure in earthquake prone area in frame structure, the shear walls behavior is similar to the column which is subjected to combined flexure and axial load. So these are also called flexural members. Shear walls require proper designing and detailing in high seismic regions. Therefore, it is necessary to determine the efficient, effective and ideal location of shear wall. This paper represents the analysis of structure with the effect of shear wall position on lateral displacement and story drift in RC frames. The analysis of shear wall was performed by STAAD Pro V8i using surface elements (shear wall).

PHYSICAL DESCRIPTION OF BUILDING

Type of structure : Special RC moment resisting frame fixed at the base
Zone : IV
Response reduction factor (R) : 5.0
Importance factor (I) : 1.0
Soil type : Medium soil
Damping ratio : 5%
Number of stories: G + 10
Imposed load : 4 kN/m2 at roof and 8 kN/m2 at floors
Depth of slab : 200 mm
Materials : M 30 concrete and Fe 415 steel
Unit weight of RRC : 25 kN/m3
Unit weight of masonry : 20 kN/m3
Columns : 300 x 300 mm
beam : 350 × 250 mm

PLAN AREA

Height of storey : 2.85m
Depth of foundation : 1.8 m
Length of building : 16.65 m
Width of building : 16.2 m
Height of building : 30.3 m

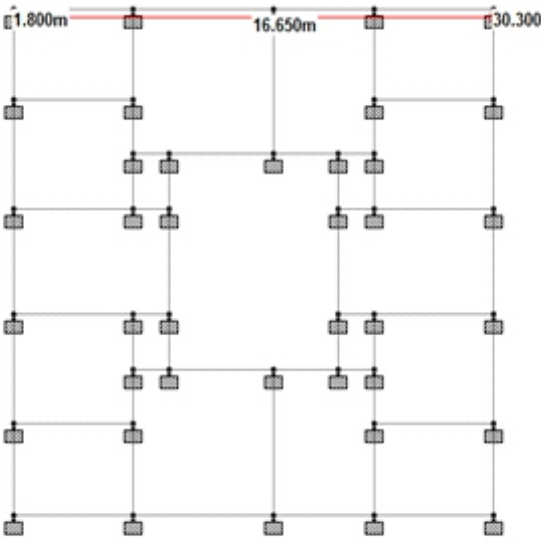


Fig 1 Plan of building

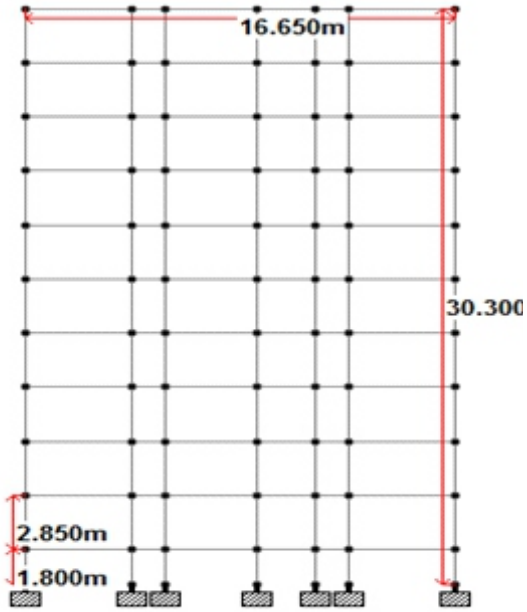


Fig 2 Elevation of building

LOAD COMBINATIONS

The following load combination have been used for the analysis of building. These load combinations are as per IS 1893 (part -1): 2002

1.5(DL + LL)

1.2(DL + LL ± EQx)

1.2(DL +LL ± EQz)

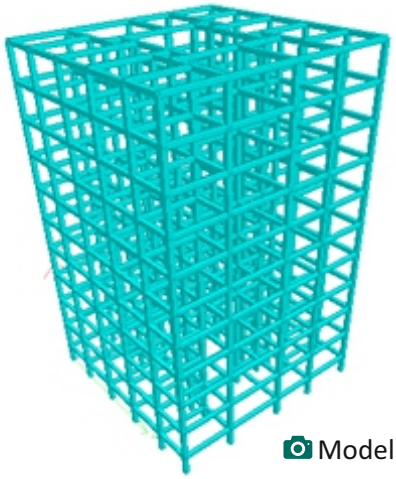
1.5(DL ± EQx)

1.5(DL ± EQz)

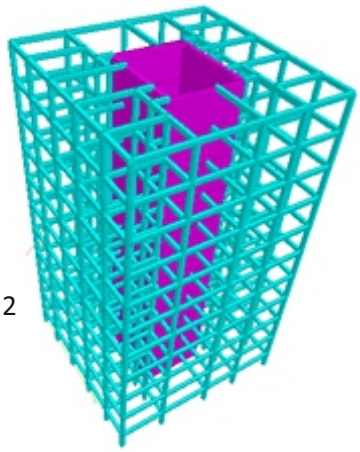
0.9DL ± 1.5EQx

0.9DL ± 1.5EQz

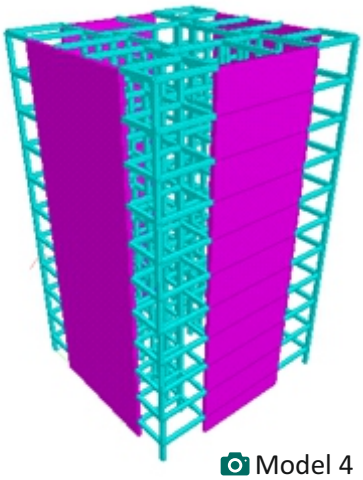
DIFFERENT LOCATIONS OF SHEAR WALL



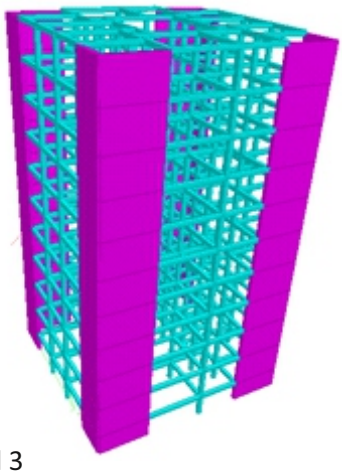
Model 1



Model 2



Model 4



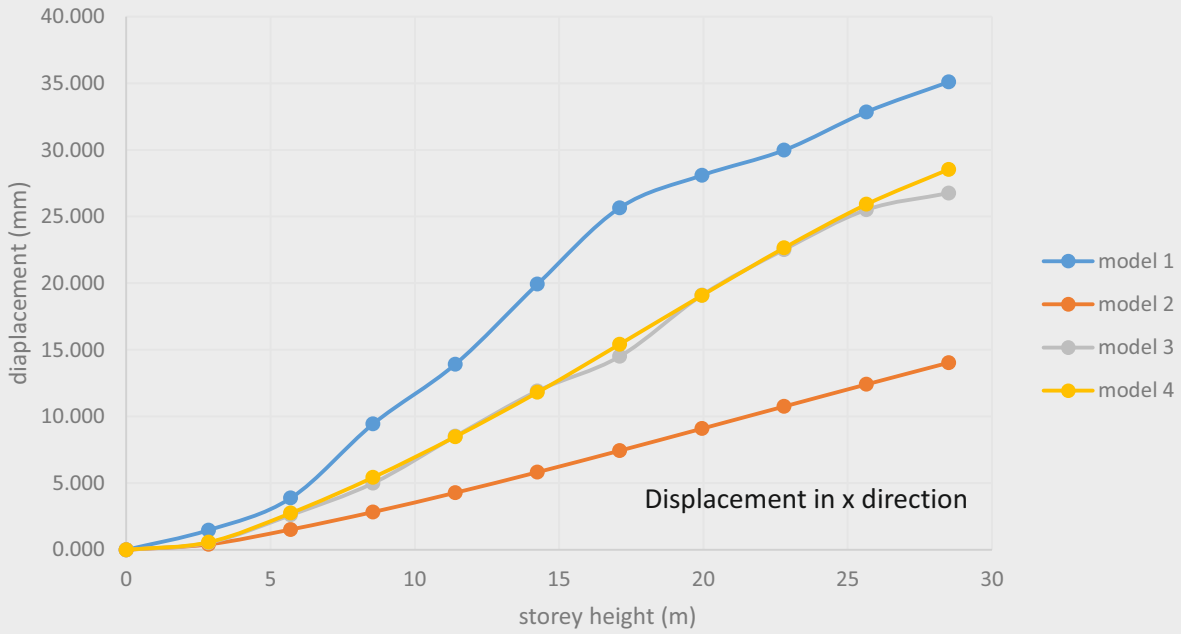
Model 3

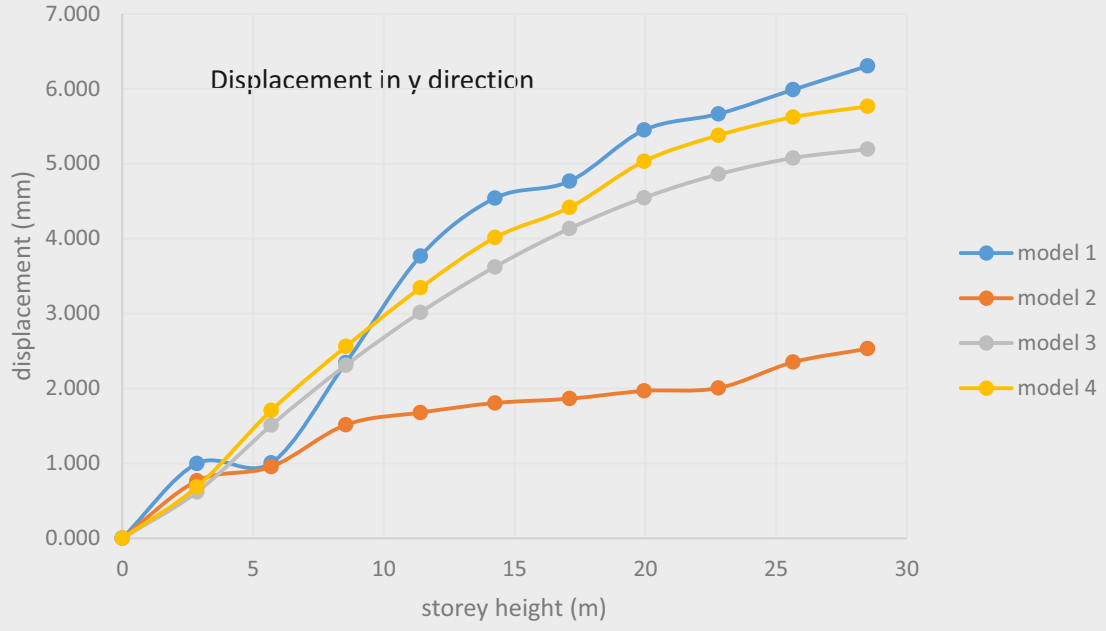
ANALYSIS AND RESULTS

The structural analysis of all models with and without shear walls have been done using STAAD Pro. The comparison of different parameters such as maximum lateral displacement, story drift is illustrated below

MAXIMUM LATERAL DISPLACEMENT

The maximum displacement of the models with and without shear wall are given below. The displacements shown below are in x direction and y direction



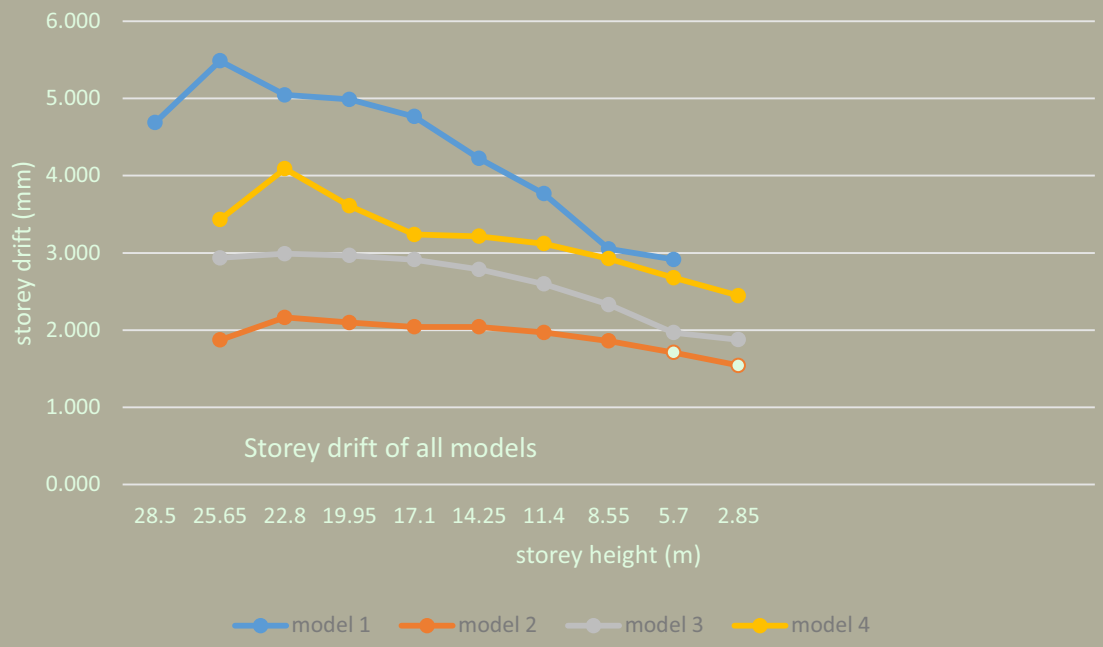


The above illustration shows the displacement in the x and y direction. It has been observed that model (1) that is without shear wall has maximum displacement in both directions. However, model (2) shows the minimum displacement in both directions.

STOREY DRIFT

Floor deflections are caused when building are subjected to seismic loads. The drift in a storey is computed as deflections of the floor at the top and bottom of the storey under considerations. The total drift in any storey is the sum of the shear deformation of that storey, axial deformation of the floor system, overall flexure of the building and foundation rotation.

Due to minimum specified design lateral force, the storey drift in any storey with a partial load factor of 1.0 should not exceed 0.004 times the storey height



Maximum storey drift permitted = 0.004 × storey height(m)

= 0.004 × 2.83 = 0.0032m

= 11.32 mm

All models are compared and drift values are obtained using non-linear static analysis. All the values of the drift are within the permissible value. From the above observation it has been observed that, building without shear wall (Model 1) has maximum story drift.

CONCLUSION

In this investigation, G+10 building has been analyzed with seismic loading by using non-linear static method. The building is modeled as 3D space frame by STAAD pro software. The four models are taken into consideration as building frame without shear wall, building frame with shear wall at the core, building frame with shear wall on sides, building frame with corner shear wall. From this we obtained as following:

o In medium to high rise building, if shear wall is not provided lateral displacement would be very high. According to analysis performed the preferred modal should be model (2)

o Presence of shear walls in structure influences the story drift at great extent. However, from the analysis it is shown that model (2) has minimum drift. Thus providing shear wall at the core of the building reduces the storey drift.

o These result indicate that shear wall at the core of the building in preferred as it gives minimum storey drift as well as lateral displacement.

Well design shear wall not only provide adequate safety, but also gives the great measure of protection against costly non-structural damage during moderate seismic disturbance.

REFERENCES

1 Earthquake resistant design of structure, S.K. Duggal, oxford higher education.

2 Pina, F. 2006, “Displacement-based seismic design of shear wall buildings”. Master's Thesis, Carleton University, Ottawa, Canada.

3 Chopra A.K., “Dynamics of Structures”,Prentice Hall, 1995

4 Datta, T.K., “Seismic Analysis of Structures”, John Wiley & Sons

5 Federal Emergency Management Agency (1997) NEHRP Guidelines for the Seismic Rehabilitation of Buildings. Report FEMA-273, Federal Emergency Management Agency, Washington DC.

6 IS 456 : 2000, PLAN AND REINFORCED CONCRETE CODE FOR PRACTICE (Fourth Revision), New Delhi – 110002: Bureau Indian Standards 2000.

7 IS 1893(Part 1) : 2002, Criteria for Earthquake Resistant design of structures, Part 1, General Provisions and Buildings (Fifth Revision), New Delhi – 110002: Bureau Indian Standards 2002.

DEATH IN AIR

November is the month whose thought brings fear among the people of the Delhi. Every winter Delhi comes under the grip of severe Air pollution.

In fact, over the past few years Delhi has been amongst the most polluted cities in the world.

In 2016, the city witnessed one of the worst periods of air pollution and once again in 2017 the same period is being repeated.

The air quality in Delhi during this period is worst, said an official of a government organization working to mitigate pollution, even as a thick smog cover that has been looming over the Capital during this period continued to spark fears of health hazards.

School Chlidren

Author

Mohammad Asif khan
B.Tech (Civil Enggineering)

Gufran Beig, project director of the System of Air Quality and Weather Forecasting and Research (SAFAR), told that foul air and heavy smog makes it the most polluted period of the season.

SAFAR data showed that the rolling average of PM 10 was 950µg/m³ and PM 2.5 was 590µg/m³. Particulate matters (PM) are tiny particles in the air that cause visibility problems and health hazards. The permissible level of PM 2.5 is 60µg/m³ and PM10 is 100 µg/m³. Levels beyond that can cause harm to the respiratory system as the fine particulates can embed themselves deep into the lungs and enter the bloodstream.

The previous worst was recorded a day ago when the rolling average of PM 2.5 was 485µg/m³ and PM 10 was 790µg/m³. The Air Quality Index (AQI) across the city on Sunday hovered around 500, according to SAFAR data. Pollution level is classified as severe if the AQI is between 401 and 500. Punjabi Bagh in west Delhi, Anand Vihar in east Delhi, Mandir Marg in central Delhi and RK Puram in south Delhi were among the most polluted areas.

“Winds are coming from north-north west, the areas where biomass burning is taking place.

“Every year, it is usually easterly winds during this time of the year, with occasional western disturbances. This year these north-north-west winds are creating problems,” Beig said.

A new report by the World Health Organisation (WHO) on ambient air pollution levels shows that with very high levels of particulate matter measuring 10 microns or less, Delhi is among the most polluted cities in the world, second only to Riyadh among the big cities.

The report — Ambient Air Pollution: A Global Assessment of Exposure and Burden of Diseases — found that 92 per cent of the world's population lives in places where air quality levels exceed WHO limits.

DEATH IN AIR

CONSEQUENCES

An estimated 3 million deaths a year are linked to exposure to outdoor air pollution. In 2012, an estimated 6.5 million deaths — 11.6 per cent of all global deaths — were linked to indoor and outdoor air pollution.

Nearly 90 per cent of air-pollution-related deaths occur in low- and middle-income countries, with nearly two out of three occurring in WHO's South-East Asia a nd Western Pacific regions.

Among diseases linked to air pollution are cardiovascular diseases, stroke, chronic obstructive pulmonary disease and lung cancer. Air pollution also increases the risks for acute respiratory infections.

The situation got worse during this year as it caused a huge impact on transportation system, which lead to several huge car accidents in the Delhi NCR region which caused a lot of damage to public and property.

NOW THE QUESTION ARISES -

"WHO IS RESPONSIBLE FOR THIS ?"

Major sources of air pollution include inefficient modes of transport, household fuel and waste burning, coal-fired power plants, fire crackers and industrial activities. However, not all air pollution originates from human activities. For example, air quality can also be influenced by dust storms, particularly in regions close to deserts.

Road dust is the top contributor to rising levels of PM 2.5 in the city

SO IS IT FAIR TO BLAME PUNJAB'S FARMER FOR DELHI RED POLLUTION MAP ?

The Government authorities have said the situation was worsened due to the "large scale" influx of pollutant-laden smoke from farm fires in neighbouring Punjab and Haryana.

WHAT WERE THE STEPS TAKEN TO CONTROL THE SITUATION ?

While Delhi reeling due to pollution since the festival of Diwali, chief minister Arvind Kejriwal announced a string of measures to fight the crisis.

1-: All schools in Delhi will remain closed for three days

2-: Th car-rationing odd-even scheme could be brought back, said Kejriwal, who admitted that the city has turned into a gas chamber

3-:He also announced a five-day ban on all construction and demolition, among other measures. Dust arising out of these activities is one of the big reasons for the rise in PM 2.5 levels

JAMIL MAHMOOD
TANVEER AHMAD
SEMESTER 6

COMPARISON OF INTRINSIC CHARACTERISTICS BETWEEN TERRESTRIAL SOIL & LUNAR SOIL

Soil and rock analysis have always been a fantasy for Civil Engineers right from the start of monumental construction era dating back to the cradles of civilisation. It is a known fact that engineers need to study and analyse the soil and other terrestrial attributes prior to initialising a structural foundation that might be later supporting a monument or a building.

Let's have a glimpse if the soil of our natural satellite (the Moon) i.e the lunar soil is versatile enough to withhold and withstand monuments and earthly structures as the terrestrial soil does.

In the light of Civil Engineering ,a variety of data analysis via astronautic observations and experimentations have inferred that **density and strength characteristics** vary locally and with depth. For instance, **in lunar soil**, densities may be as low as 1 g/m³ at the surface in some areas but may increasingly scale to 2 g/m³ with the rise in depth on centimetre scale. The average value say 1.5 g/m³ is probable at depths of 10 to 20 cms.

For Terrestrial soil, density is typically 2.60 to 2.75 grams per cm^3 and is usually unchanging for a given soil. Soil particle density is lower for soils with high organic matter content, and is higher for soils with high iron-oxides content.

Terrestrial soil

Lunar soil

Additively, **for a given lunar soil**, **porosity** appears to be the most important single parameter controlling cohesion and friction angle---exhibiting a range of 0.1 to 1 kN/m^2 and the most probable range of lunar soil friction angle is about 30° to 50° with the higher values associated with lower porosities. **However, lunar soil analysis have also disclosed the fact that soil on a slopy area is less dense and weaker than that on a level area.**

In terrestrial soil analysis, we measure porosity by water absorption test. Porous building blocks will allow water to penetrate the wall, will tend to expand and shrink seasonally and have reduced durability. An upper limit of 15 % has been proposed; but a well-stabilized building block (on earth soil) should have a water absorption of not more than 10%.

Besides, another significant property that greatly contributes to the load carrying capacity of any soil is its **shape and size**—(in short 'granulometry').

JAMIL MAHMOOD
TANVEER AHMAD
SEMESTER 6

For a given sample of lunar soil, for the most part, consist of small mineral particles that differ in shape. The particles easily stick to each other to form separate clumps and aggregates. In its granulometric composition (in common words ,as per shape and size), lunar soil resembles **dusty sand**. Structures that are constructed on sandy soils are relatively unstable, with no plasticity at all.

Be its **lunar** soil or **terrestrial** soil, construction of houses atop sandy soils require deep foundations that might be relatively costlier as compared to other forms of soils.

For terrestrial soil, GB and GW are the best soils for foundation purpose ---

G : gravel
W: well graded with little or no fines
B: well graded with clay binder

For **lunar soil analysis** , it happened that Apollo 11 to 17 have collected various soil samples from the moon and decisive test and experiments were carried , yielding the range of inhomogeneity from 2.77 to 4.41 orderly.

Coming to **terrestrial soil**, here on earth we have **Soil** as a mixture of minerals, organic matter, gases, liquids, and countless organisms that together support life on Earth. Despite of being a parameter of building construction criteria , terrestrial soil also has two important functions: it is a medium for vegetative growth & is a modifier of Earth's atmosphere unlike the lunar counterpart , because the Moon doesn't have an atmosphere of its own; as such the aforesaid factors intrinsically modify a soil stratum—be its lunar or terrestrial --- and are decisively assembled parameters of foundation of a building prior to construction.

Now let's have a view on **Bulk density and void ratio**. The main factor that determines the physical characteristics of a **lunar soil sample** is the degree of packing, as estimated by the void ratio (i.e., ratio of void volume to solid volume).

Average bulk density of the lunar soil in the ***intercrater areas:***

Average bulk density, g/cm^3	Depth range, cm
1.5	0 – 15
1.58	0 – 30
1.66	0 – 60
1.74	30 – 60
1.9	300

JAMIL MAHMOOD
TANVEER AHMAD
SEMESTER 6

For terrestrial soil sample, a lower bulk density by itself does not indicate suitability for plant growth due to the influence of soil texture and structure.

Bulk density of some of the common and recommended soils :

Gravel, (loose, dry)	=	1,520 kg/m^3
Gravel,(with sand)	=	1,920 kg/m^3

Summarizing, from Geotechnical point of view , the results of the lunar study of soil physical and mechanical properties based on the samples delivered to the Earth and measurements made in situ are in very good agreement and demonstrate that the processes of lunar soil formation have very much in common over vast areas. Overall, it's on the geotechnical engineers to **envisage the finalization of structural foundation atop lunar soil ; as the process of amelioration and capitalization is ever – perpetuating.** The data acquired may serve as a basis for developing soil simulants intended for setting up modern space technology for further investigation and exploration of the Moon.

جامعہ کا ترانہ

ہوئے تھے آ کے یہیں خیمہ زن وہ دیوانے
اُٹھے تھے سن کر جو آواز ہبران وطن

یہیں سے شوق کی بے ربطیوں کو ربط ملا
اسی نے ہوش کو بخشا جنوں کا پیراہن

یہیں سے لالۂ صحرا کو یہ سراغ ملا
کہ دل کے داغ کو کس طرح رکھتے ہیں روشن

دیارِ شوق میرا، شہرِ آرزو میرا

یہ اہلِ شوق کی بستی یہ سر پھروں کا دیا
یہاں کی صبح نرالی، یہاں کی شام نئی

یہاں کے رسم و رہ سے کشی جدا سب سے
یہاں کے جام نئے طرح رقص جام نئی

یہاں پہ تشنہ لبی سے کشی کا حاصل ہے
یہ بزم دل سے یہاں کی صلائے عام نئی

دیارِ شوق میرا، شہرِ آرزو میرا

یہاں پہ شمع ہدایت ہے صرف اپنا ضمیر
یہاں پہ قبلہ ایمان کعبہ دل ہے

سفر ہے دین یہاں ، کفر ہے قیام یہاں
یہاں پہ راہ روی خود حصول منزل ہے

شناوری کا تقاضہ نو بہ نو طوفان
کنار موج میں، آسودگی ساحل ہے

دیارِ شوق میرا، شہرِ آرزو میرا