A low-angle, upward-looking photograph of several modern skyscrapers with glass facades, creating a sense of height and architectural scale. The image is overlaid with a semi-transparent blue filter.

Department of Civil Engineering

Area of Research

Passive Solar Architecture, Energy
Efficient Building Design
Thermal Performance Evaluation

Hydrological Modelling, Climate
change Impact and Projection
studies, Surface Hydrology, Flood
risk management, GIS and Remote
Sensing, Data mining

Seismic soil-structure interaction,
Site response analysis, Soil
liquefaction, Stochastic variability,
NDT testing of RCC structures

Steel Fiber-Reinforced Concrete,
Reinforced Concrete, Steel-Concrete
Composite Structures, PPVC

Uncertainty Quantification,
Reliability Analysis of Flexible
Pavements, Demand-Responsive
Transportation

Sustainability in Building
Design

Hydrological Modeling

Impact of Climate Change

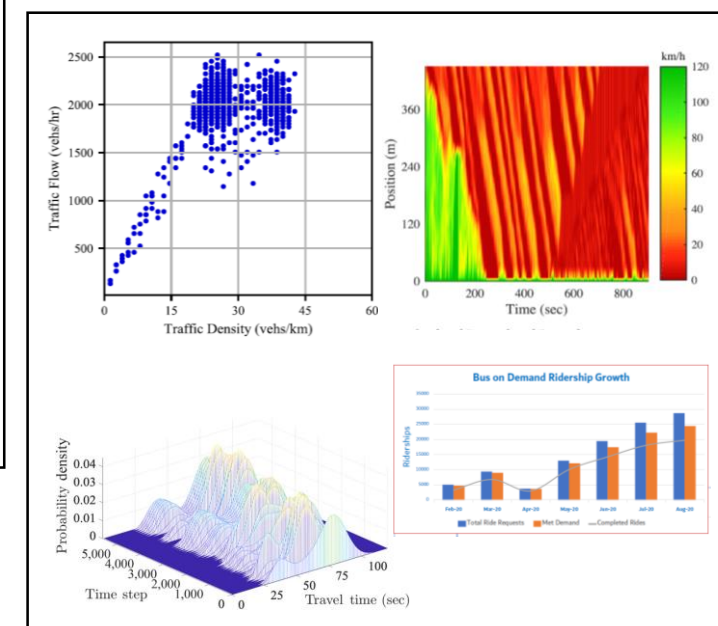
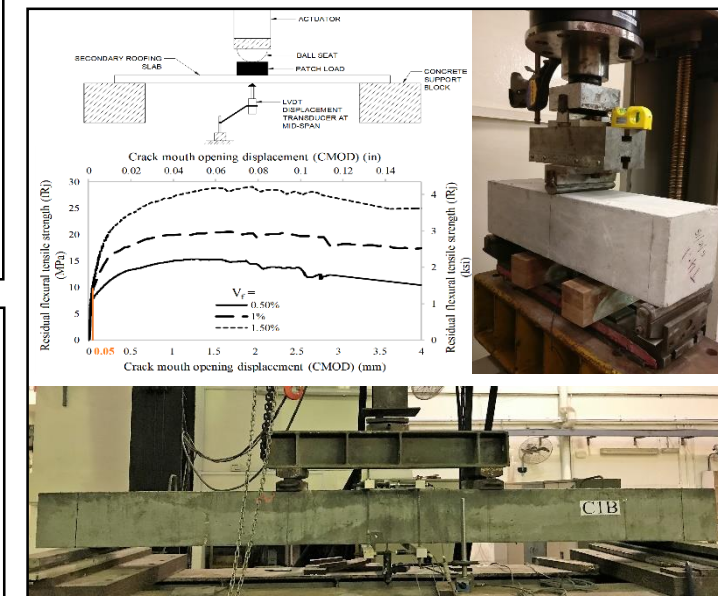
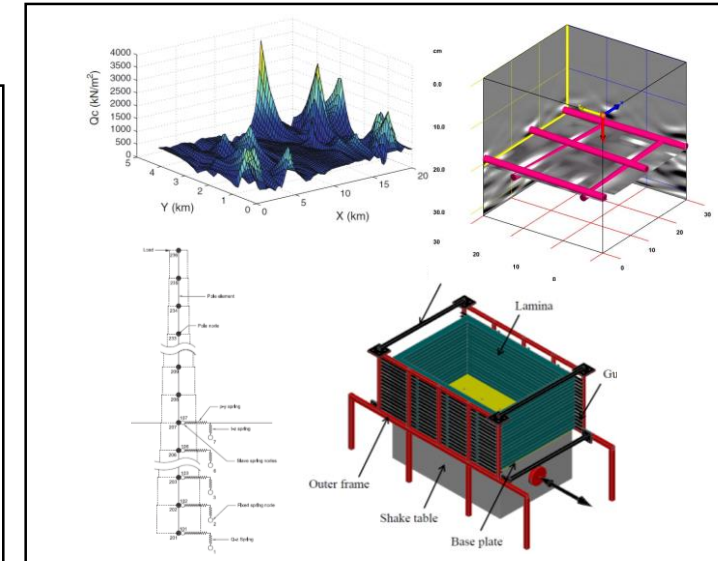
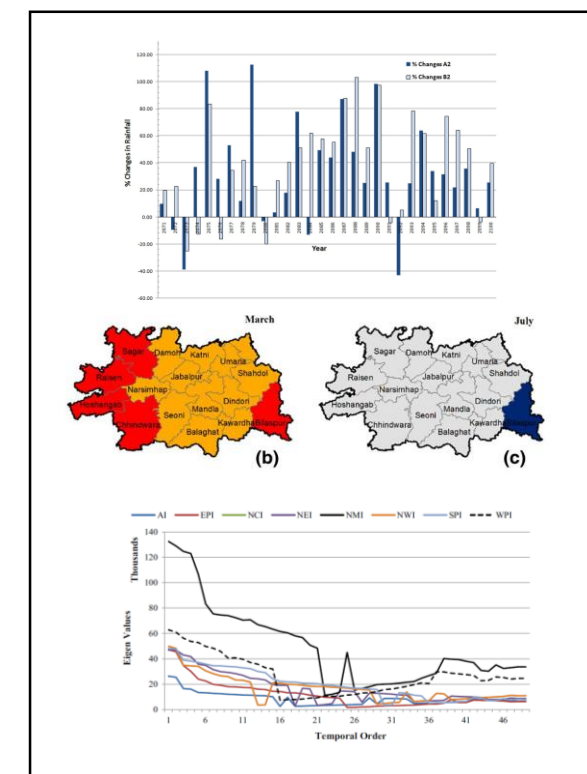
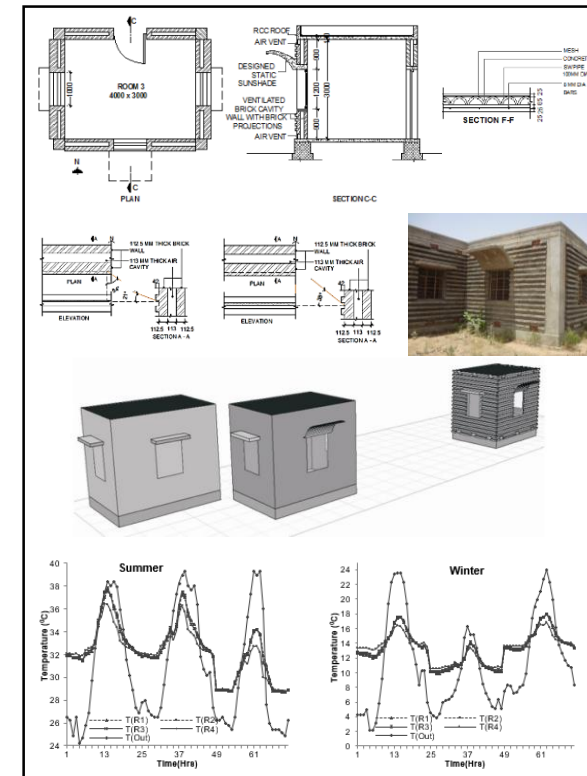
Seismic Soil Structure
Interaction

Non-destructive Testing
Techniques

Testing of Structural
Members

Pavement Design

Modelling & Simulation





Dr. Akshay Venkateshwaran

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Enhanced construction productivity using steel fiber-reinforced concrete as a load-carrying material

Research Areas: Steel Fiber-Reinforced Concrete, Reinforced Concrete, Steel-Concrete Composite Structures, PPVC

Ongoing research

Short discrete steel fibers have been used mainly for crack and shrinkage control in concrete members. However, with the latest developments in the steel fiber industry, studies have shown that there is a significant enhancement in the tensile and flexural strength of concrete with the addition of steel fibers. Consequently, in recent times, steel fiber reinforced concrete (SFRC) has found wide applications in structural members devoid of traditional reinforcement such as slab-on-pile systems, composite columns, and lightweight elevated slabs.

Research consists of experimental and analytical investigations on the structural behavior of SFRC flexural members, with focus on steel-concrete composite long columns and lightweight SFRC slab - downstand beam dowel connections.



Selected Outcomes:

Secondary Roofing Slabs with Structural Synthetic Fibers:

Secondary roofing slabs with non-corrodible fiber-reinforced mortar (FRM) was designed through a comprehensive and successful test and analytical program.

Design of Steel Fiber-Reinforced High-Strength Concrete- Encased Steel Short Columns and Beams

The possibility of completely replacing traditional steel bar reinforcement by steel fibers in high-strength concrete-encased steel columns and beams was demonstrated, showing potential for ductile structural behaviour and reduction in construction time.

Moment Redistribution in Steel Fiber Reinforced Continuous Slabs

The phenomenon of moment redistribution was investigated in continuous SFRC slabs. A unique prediction model was proposed understanding its behavior.

Selected References

1. Venkateshwaran A., Lai B. and Liew J.Y.R (2021) Design of steel fiber reinforced high strength concrete-encased steel short columns and beams, ACI Structural Journal, Vol. 118, Issue 1, pp. 45-59.
2. Venkateshwaran A., Krishnan P. and Liew J.Y.R. (2020) Fiber reinforced mortar for secondary roofing slabs, Structural Concrete (journal of the fib), <https://doi.org/10.1002/suco.202000275>
3. Venkateshwaran A. and Tan K.H. (2019) Moment redistribution in continuous steel-fiber-reinforced-concrete slabs, Structures and Buildings, Proceedings of the ICE, UK, Vol. No. 3, pp. 161-174



Dr. Brij Kishor Pandey

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Our work focuses on hydrological modelling, scenario based climate change impact studies, land use land cover mapping using RS and GIS.

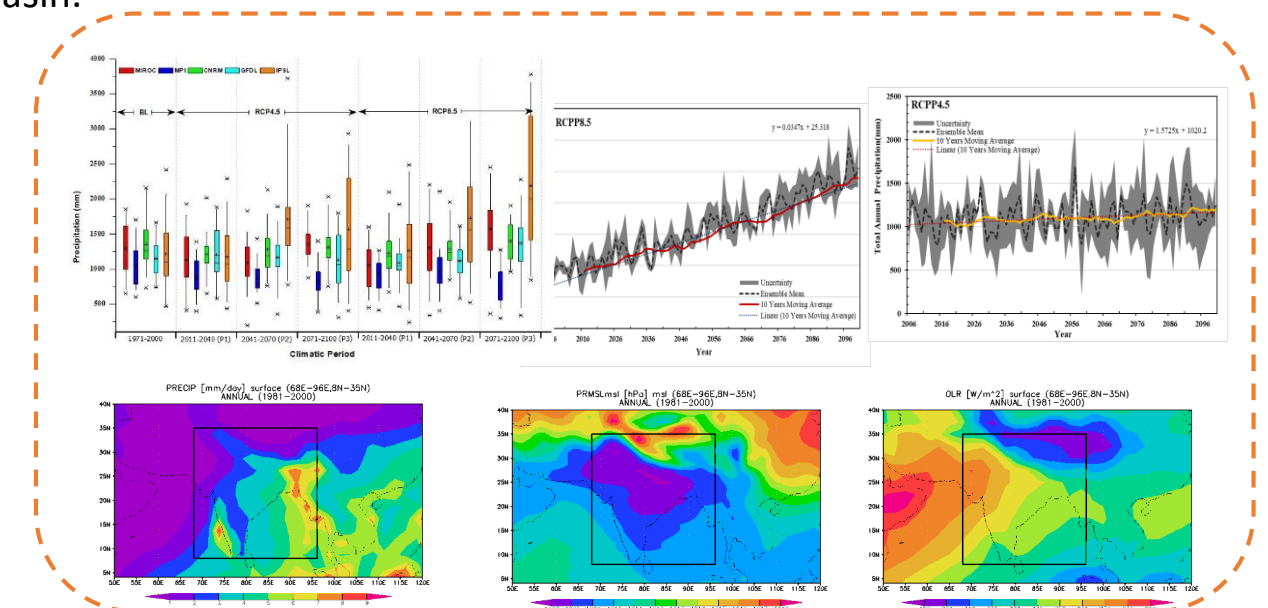
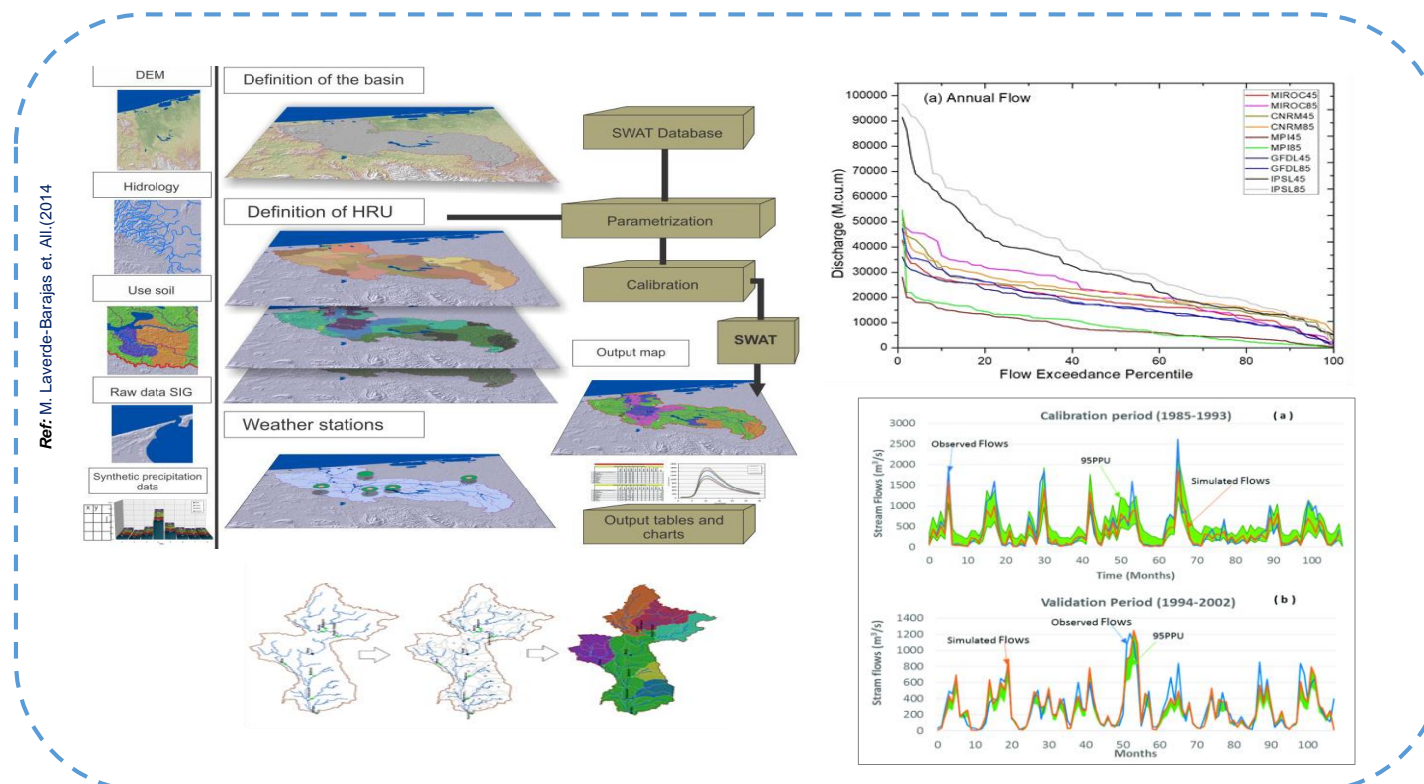
Research Areas: Hydrological Modelling, Climate change Impact and Projection studies, Surface Hydrology, Flood risk management, GIS and Remote Sensing, Data mining

Ongoing research

'Water is the essence of life'.

There is remarkable change in nature of the global discussion of issues of climate change and its effect on water resources availability. These issues in particular are disturbing the sustainable development planning and management of water resources. Water resources are very important for agricultural sector, power generation, ecosystem and human health, moreover its requirement is raising day by day with population growth. However increasing water demand can be anticipated but changes in environment and its impacts on human and other ecosystems are locally unpredictable. Therefore, it is important to plan and manage the water resources considering anthropogenic effect and environmental changes.

Our research area is focused on hydrological modelling and estimate the impact of climate change on water resources of the river basin. Understanding of projected climate change and response of the basin under these changes will provide to devise better strategies for planning and management of water resources in the basin. Moreover, our study would be helpful in the assessing vulnerability and risk associated with extreme events of the water resources of the basin.



Selected Publications

- Pandey, B. K., Khare, D., Kawasaki, A., & Meshesha, T. W. (2021). *Journal of Hydrology*, Elsevier 126429.
- Brij K Pandey*, D. Khare, A. Kawasaki, P.K. Mishra (2019) *Water Resources Management*, Springer.
- Brij K Pandey*, Deepak Khare (2017) *Environment Earth Science*, Springer
- Brij K Pandey*, H. Tiwari, Deepak Khare (2017) *Hydrological Science Journal*, Taylor & Francis.



Dr. Deepthi Mary Dilip

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“ Our research is focused on safe and sustainable infrastructure systems ”

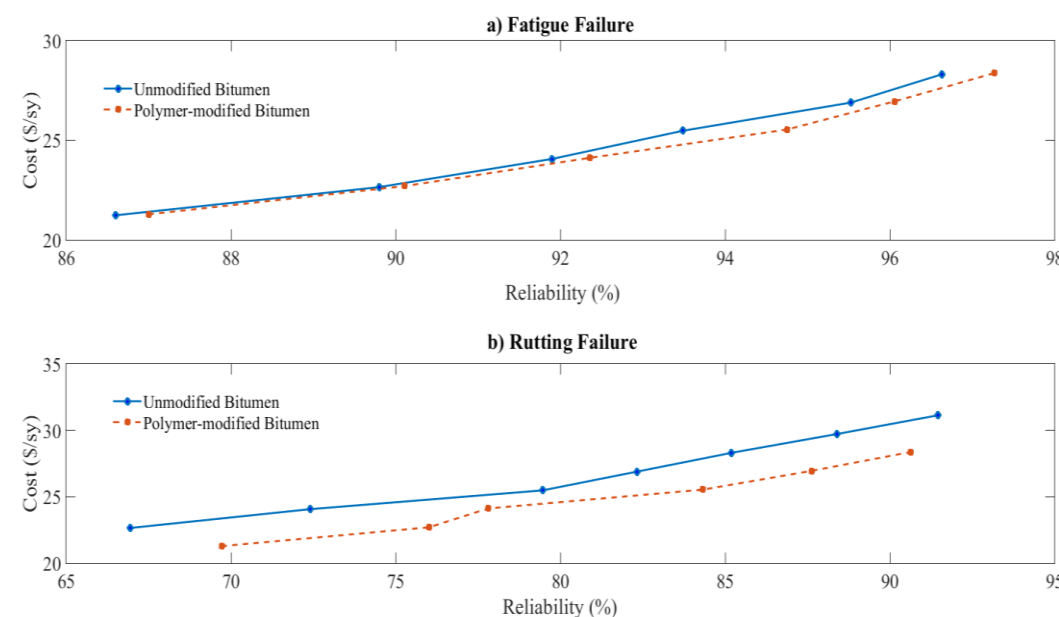
Research Areas: Uncertainty Quantification, Reliability Analysis of Flexible Pavements, Demand-Responsive Transportation

Ongoing research

Pavement Design

The design of any structure involves making engineering decisions in the face of uncertainties. In the case of flexible pavements, the presence of uncertainties in the design process is quite pervasive; arising from a number of sources including the material properties, traffic loads, drainage conditions, construction procedures, and environmental factors such as temperature and rainfall. Efforts to quantify these uncertainties, and build long-lasting reliable structures, have led various highway agencies to shift their focus away from deterministic designs to reliability-based approaches.

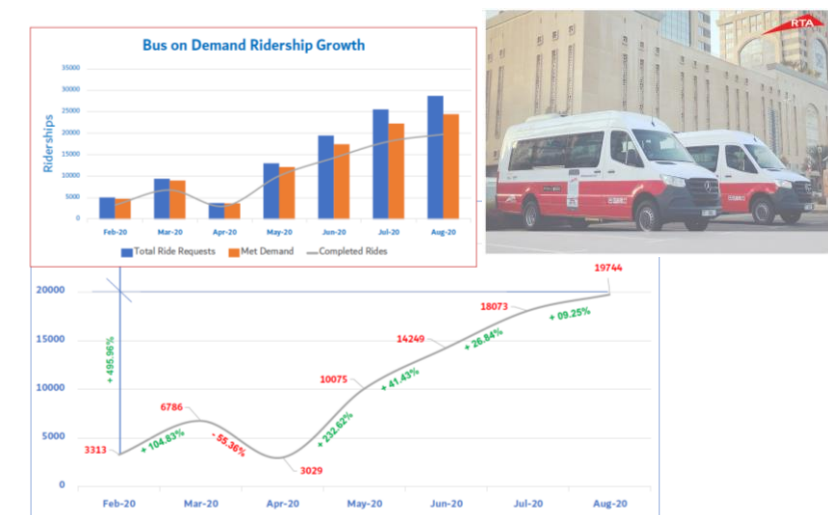
- **Research Focus** : Probabilistic analysis of flexible pavement structure within the Mechanistic-Empirical design is carried out to address the premature failure of flexible pavements predominantly caused by rutting and fatigue cracking.
- **Research Findings** : Pavement structures modified with plastic are more cost-effective than the conventional design alternatives, even in the presence of higher uncertainties.



Demand- Responsive Transportation

Bus-on-demand is a Demand Responsive Transport (DRT) form of public transport which is characterized by flexible routes and schedules along with convenient pick-up and drop-off points dictated by the passenger needs.

Research Focus : Developing methodologies that can ensure a balanced, efficient and affordable on-demand shared mobility to achieve a citywide integrated public transport system using advanced technology-based demand responsive mobility management platform procured under a suitable PPP Model.



Selected References

- Dilip, D. M., & Babu, G. S. (2021). Reliability-based design optimization of flexible pavements using Kriging models. *Journal of Transportation Engineering, Part B: Pavements*, 147(3), 04021046.
- Fathima Sana, V., Nazeem, K., Dilip, D. M., & Babu, G. S. (2021). Reliability-based design optimization of shallow foundation on cohesionless soil based on surrogate-based numerical modeling. *International Journal of Geomechanics*, Accepted.
- Jabari, S. E., Freris, N. M., & Dilip, D. M. (2020). Sparse travel time estimation from streaming data. *Transportation Science*, 54(1), 1–20.



Dr. Meghana Charde

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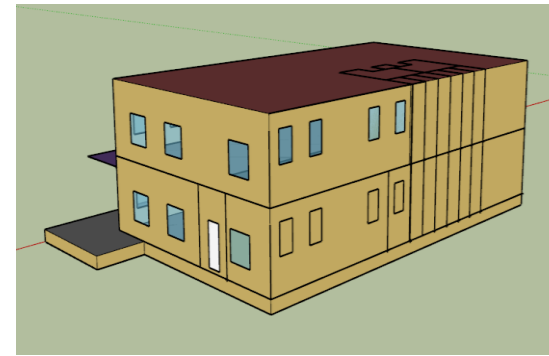
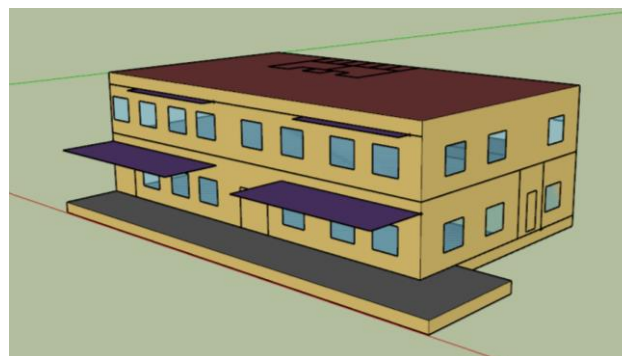
Design and development of passive strategies for energy efficiency in buildings

Research Areas: Passive Solar Architecture; Sustainability in Building Design

Abundantly available solar energy can be utilized to supplement energy needs of a building either passively or actively. The life span of buildings is extensive, varying from 50-100 years. Thus it is important to improve the energy efficiency of existing buildings to reduce the global energy use. There are various possibilities in architectural design to conserve energy. This can be achieved by designing the building elements considering climate of the place. Our research group's focus is on the design and thermal performance evaluation of passive elements for energy efficiency in buildings.

Ongoing research

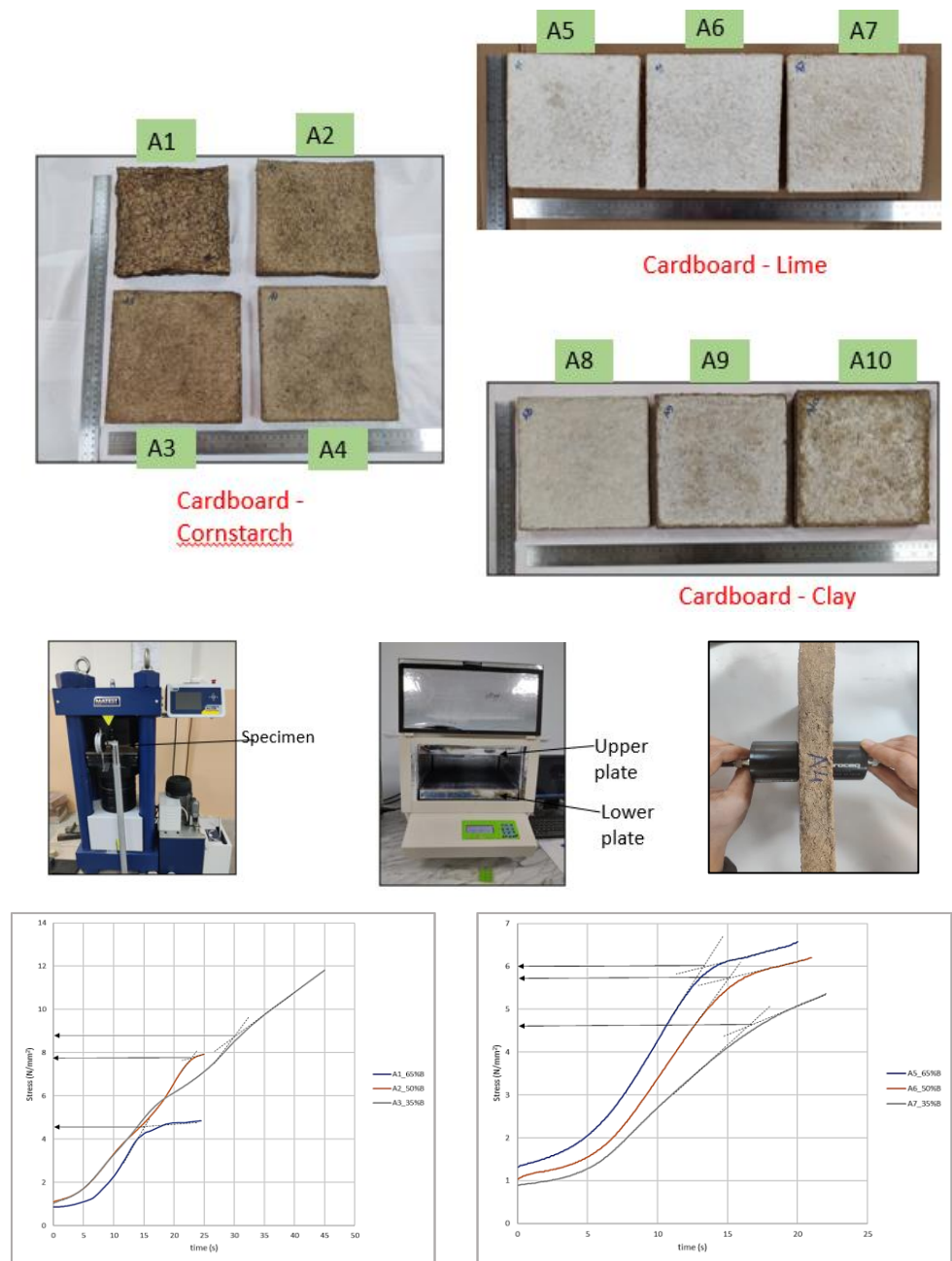
Building envelope green retrofit or upgrade strategy like use of insulation materials is an effective way to achieve energy efficiency in buildings. Thermal insulation panels made up of recycled paper and three different binders viz. corn starch, lime and clay in varying proportions have been fabricated. Various tests are being carried out in the lab to study thermal, physical and mechanical properties of the panels. Simulation studies using SketchUp, OpenStudio and EnergyPlus softwares are being carried out to optimize the wall thickness of a cavity wall for improving the energy efficiency of buildings in Dubai.



Simulation study

Selected Publications:

- Charde M, Gupta R, Vemuri A, Kheterpal A, Bhati S, Passive Solar Design for Energy Efficiency in Buildings in Composite Climate, Journal of Physics: Conference Series, IOP Publishing, 1276, 012080, 2019.
- Charde, M., Bhati, S., Kheterpal, A., Gupta, R., 2014. Comparative thermal performance of static sunshade and brick cavity wall for energy efficient building envelope in composite climate, Thermal Science, 18, 925-934.
- Charde, M., Gupta, R., 2013. Annual thermal performance of a hollow roof in combination with a cavity wall and static sunshade: Experimental study of energy-efficient rooms, Journal of Energy Engineering ASCE 139, 281-289.



Fabrication and Testing of Thermal Insulation Panels



Dr. Vivek B.

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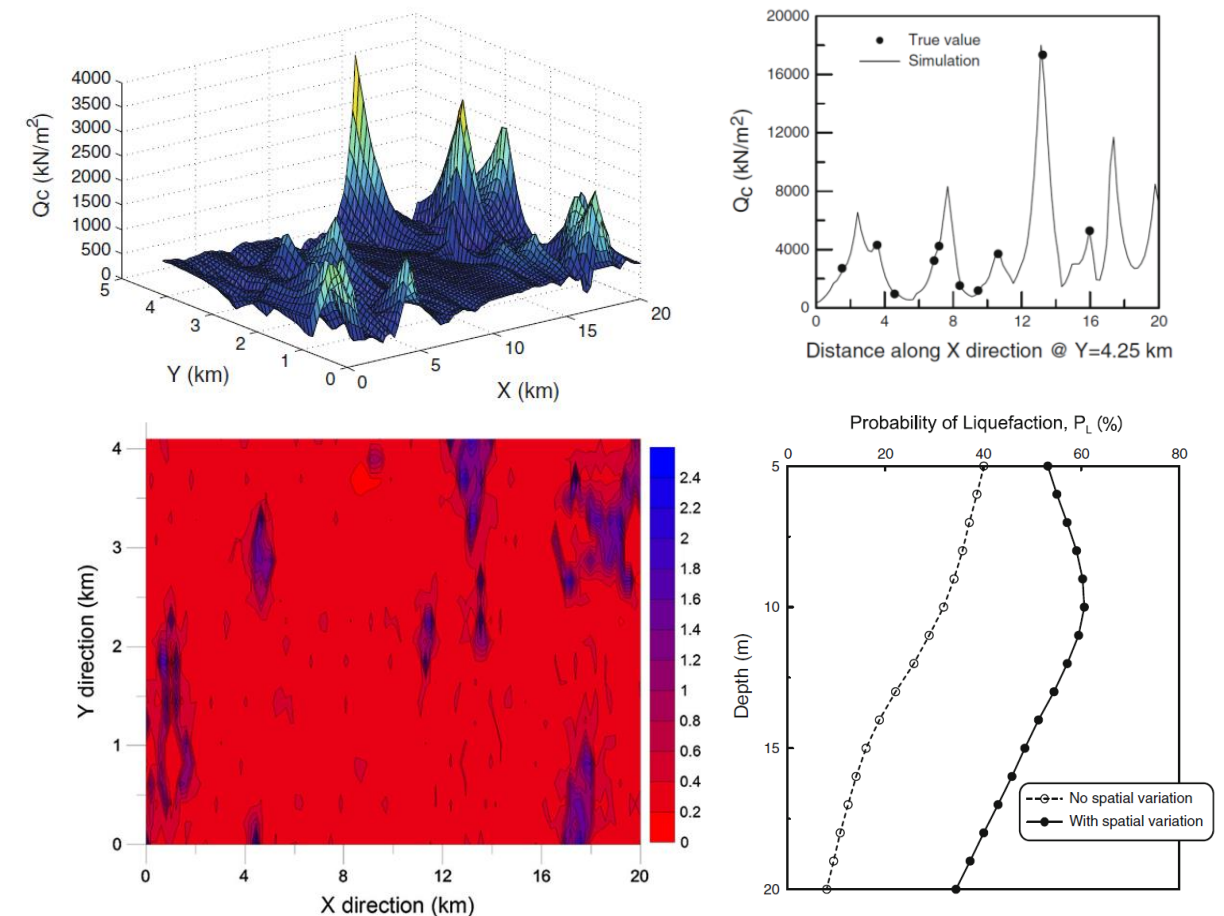
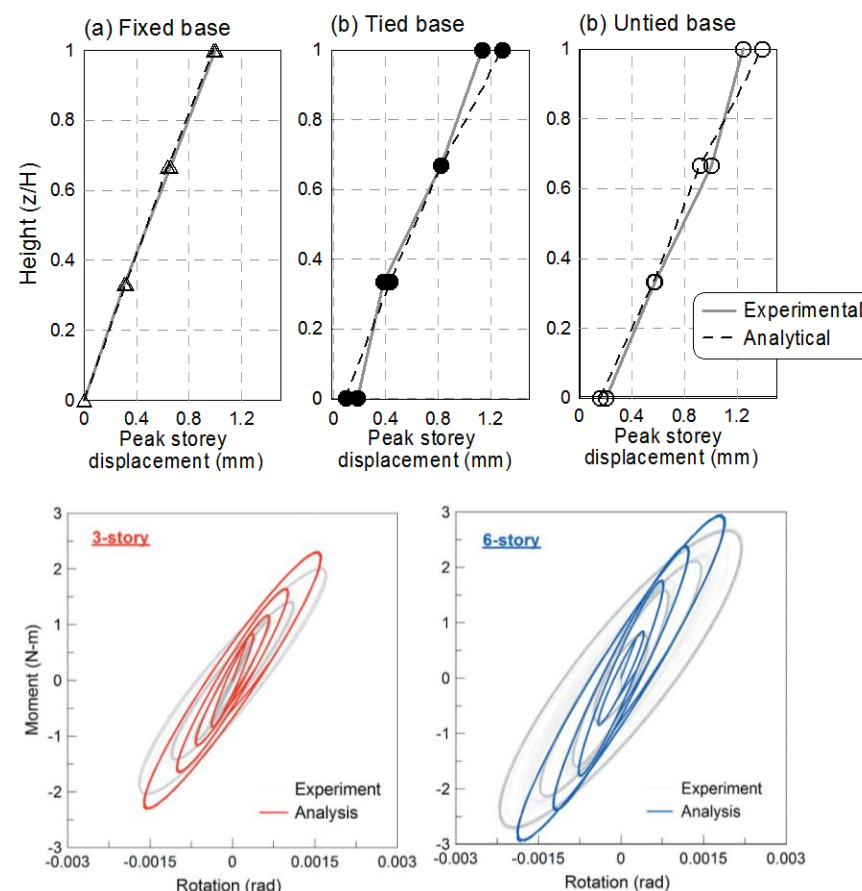
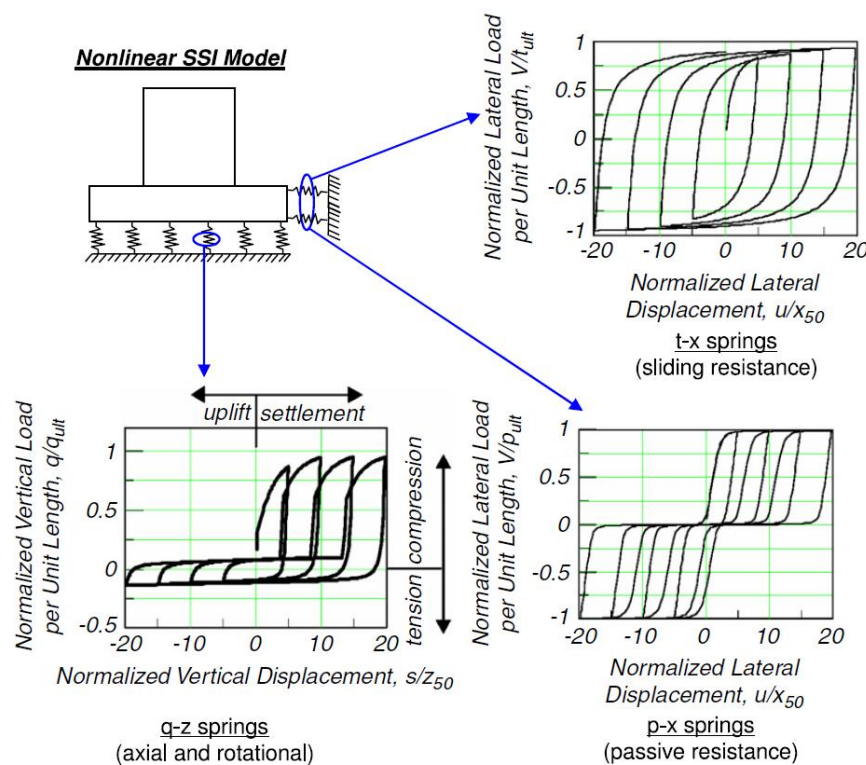
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“ Our research focus to study ways to improve the resilience of infrastructure to extreme events. ”

Research Areas: Seismic soil-structure interaction, Site response analysis, Soil liquefaction, Stochastic variability, NDT testing of RCC structures

Ongoing research

- Comprehensive numerical and experimental investigation of the effects of seismic soil-structure interaction on low to medium rise buildings and to develop strategies to improve the resilience of the structure.
- Develop performance based model to predict the response of buildings with combined piled raft foundation during a dynamic excitation.
- Site specific probabilistic evaluation of liquefaction potential incorporating the spatial variability of soil parameters.
- Develop optimal composition of construction and demolition waste in concrete as a replacement of concrete components.



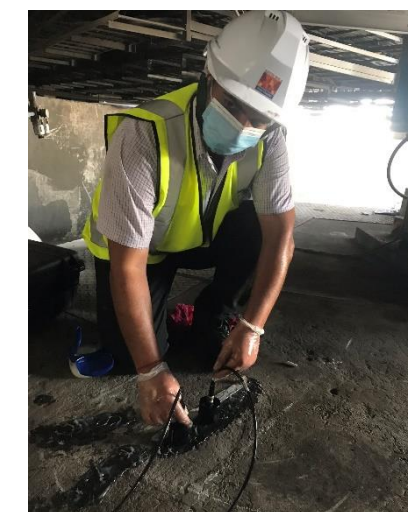
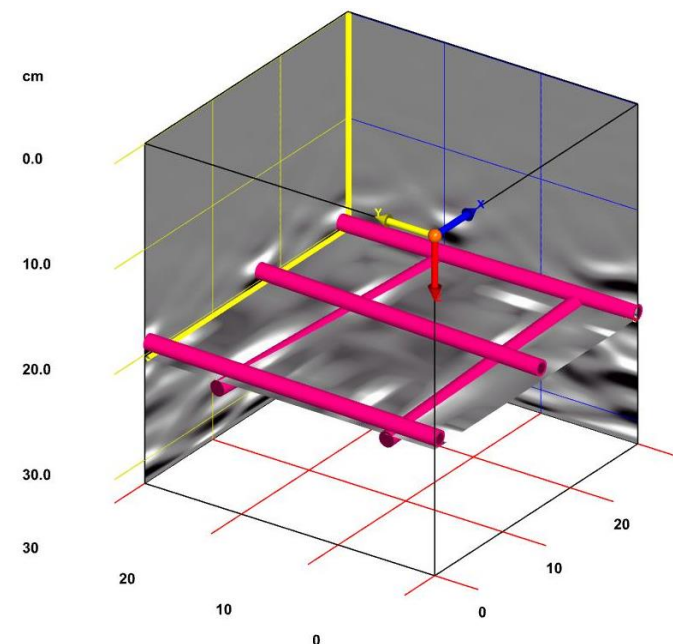
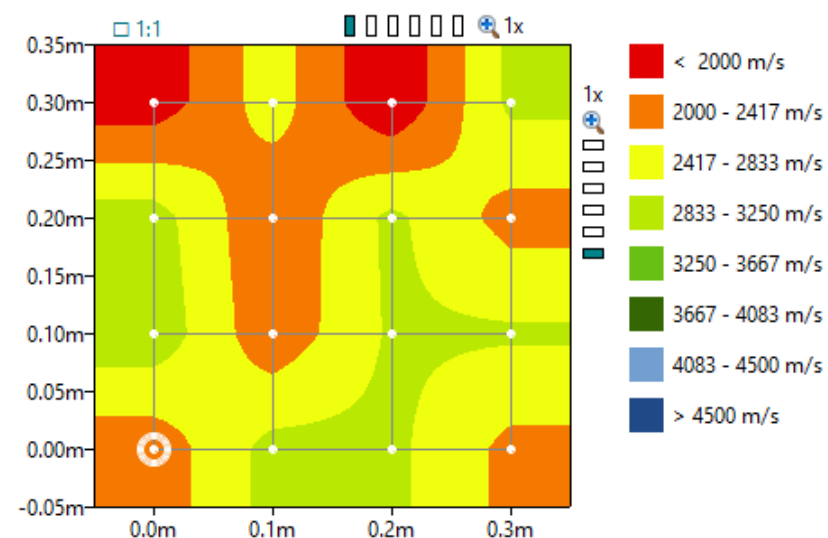
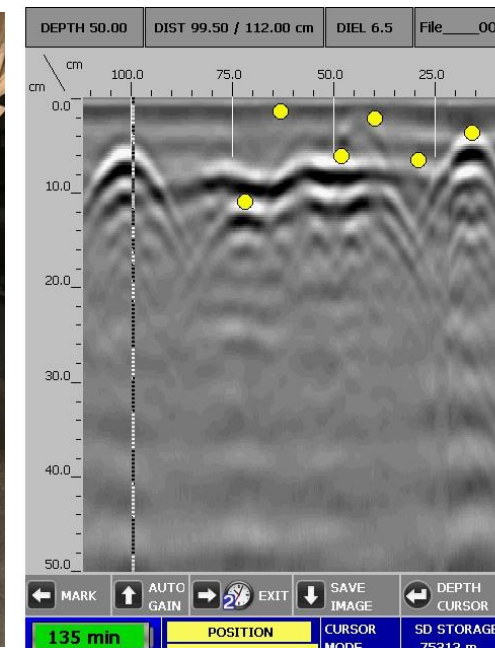
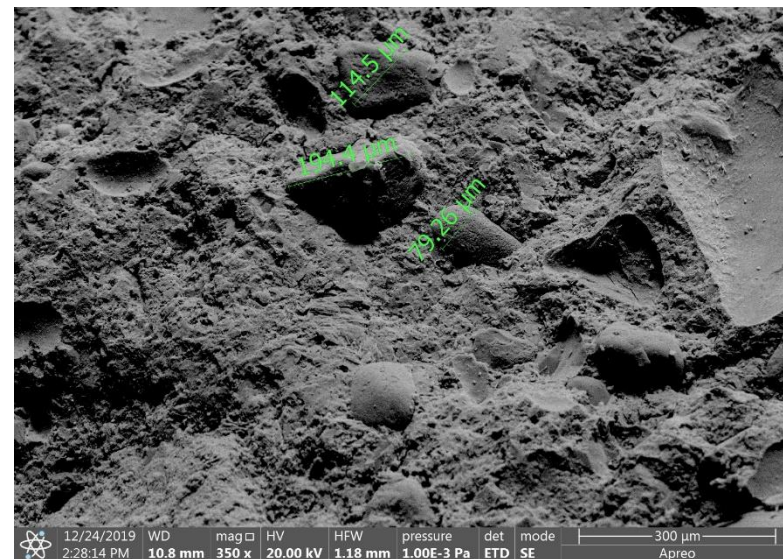
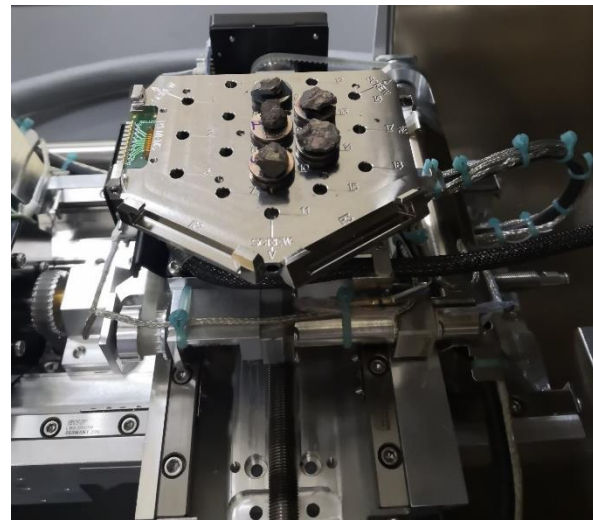
Selected References

- B. Vivek and Prishati Raychowdhury (2020), "Soil-Structure Interaction Study on 3D SMRFs of Indo-Gangetic Plain Using Resonant Vibration Tests" Journal of Earthquake Engineering, pp-1-23.
- Vivek, B. and Raychowdhury, P. (2017). "Influence of SSI on Period and Damping of Buildings Supported by Shallow Footings on Cohesionless Soil", International Journal of Geomechanics (American Society of Civil Engineers), Vol. 17(8), pp. 1-14.
- Vivek, B. and Raychowdhury, P. (2014). "Probabilistic and Spatial Liquefaction Analysis using CPT Data: A Case Study for Alameda County Site.", Natural Hazards (Springer), Vol. 71, pp. 1715-1732.

CONSULTANCY PROJECTS



- Industrial Consultancy: NDT of Coal Mill foundation. 2020.
PI: Dr. Vivek B., Co-PI: Dr. Brij Kishor Pandey, Dr. Baharudeen
- Industrial Consultancy: Visual inspection of an under pass tunnel for Al Nakhla Crusher, Fujira, UAE. 2019
PI: Dr. Vivek B., Co-PI: Dr. Sridhar G
- Industrial Consultancy: Condition assessment of raw mill foundation - Field and Laboratory Investigation. 2019
PI: Dr. Vivek B., Co-PI: Dr. Sridhar G., Dr. Ram Karthikeyan



1



Ms. Jemi Mathews

Research Topic: *Building retrofit study in hot arid climate.*

Abstract: The study aims to design and implement energy efficient strategies for buildings in Dubai, UAE to attain energy efficiency. Thermal insulation panels have been designed and fabricated using paper wastes and eco-friendly binders and tested for physical, thermal, mechanical and microstructure characterization. A simulation study will be performed to understand the change in energy consumption in a building using the fabricated thermal insulation panels.

2



Ms. Sripriya Dharshini

Research Topic: *An integrated approach to assess water security under climate change impact: Influence of aerosols on evapotranspiration*

Abstract: The study is expected to estimate and analyze the water balance due to impact of climate change drivers and assess sector-wise water security using indicators and provide an understanding on -
- Role of atmospheric aerosols in terrestrial climate system and its attribution in the climate change study.
- The impacts of climate change on water yield and evapotranspiration under future climatic scenarios. -
Water stress index, sector-wise helps in planning and policy making.

3



Mr. Utpal Deka

Research Topic: *Development Methodology for a Commercially Sustainable Citywide Bus-on-Demand Services under a Public Private Partnerships (PPP) Model in Dubai.*

Abstract: The objective of the research project is to develop a methodology that can ensure a balanced, efficient and affordable on-demand shared mobility in order to achieve a citywide integrated public transport system by using an advanced technology-based demand responsive mobility management platform procured under a suitable PPP Model.

LABORATORY EQUIPMENTS

Concrete Lab

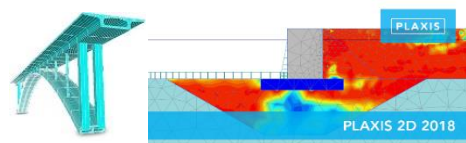
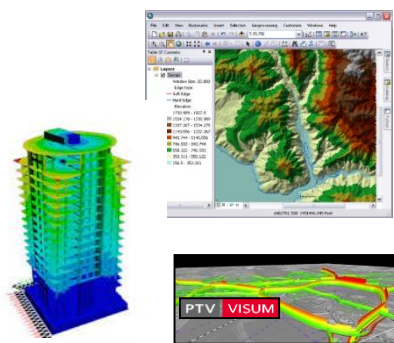


Shake Table II - Quanser
Servopulser 100 kN Dynamic UTM
Compression Testing Machine
Ground Penetrating Radar - GSSI Structurescan mini LT
Ultrasonic Pulse Velocity Equipment - Pundit PL-200PE
Surface Resistivity Meter - PROCEQ Resipod
Half Cell Potential Equipment - CORMAP 1
Abrasion Testing Machine
Vee Bee Consistometer
Concrete Mixer
Blaine air permeability apparatus
Vicat apparatus
Le-Chatelier Apparatus
Compaction factor apparatus
Rebound hammer
Le-Chatelier Flask



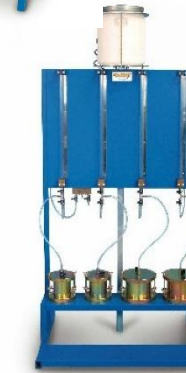
CAD Lab

Bentley STAAD.Pro Connect
ArcGIS - GIS and Mapping softwares by Esri
PLAXIS 2D - Bentley Systems
PTV VISSIM - Traffic Simulation Software
AutoCAD - Autodesk
Abaqus FEA - Simulia
MATLAB – MathWorks



Transportation Lab

Brookfield Viscometer
Flash and Fire point tester
Ductilometer
Ring and ball Softening point Apparatus
Standard Digital Penetrometer
Flakiness and Elongation Gauge
Aggregate Impact Value Apparatus
Efflux Index Apparatus



Soil Mechanics Lab

Triaxial Testing Machine
Consolidation apparatus
Digital Shear Testing Machine
Relative Density Equipment
CBR Testing Machine
Proctor Compaction Kit
Permeability Testing Equipment
Motorized Sieve Shaker
Hydrometer
Atterberg Limit Kit

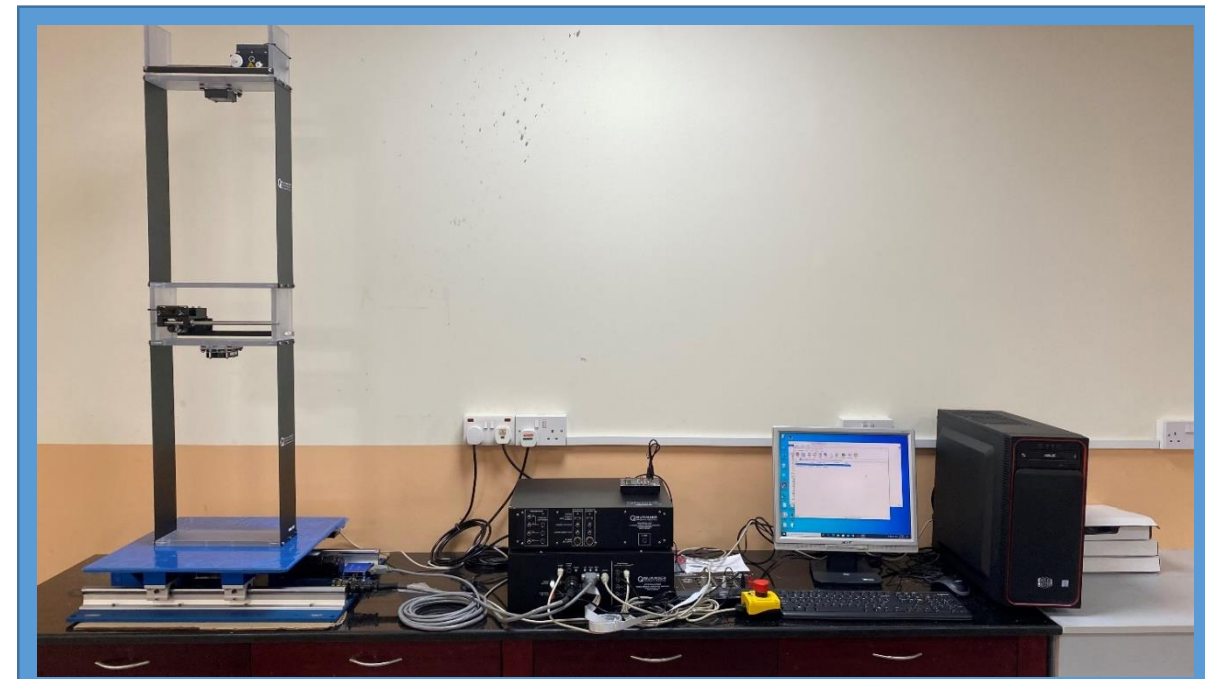
Surveying Lab

Electronic Theodolite
Electronic Total Station
Laser Distance meter
Dumpy level
Prismatic compass
Precision Measuring Wheel
Automatic laser level
HOBO Weather Station





Servopulser 100 kN Dynamic UTM



Shake table and AMD



Compression testing machine



- A. Ultrasonic Pulse Velocity Equipment - Pundit PL-200PE
- B. Ground Penetrating Radar - GSSI Structurescan mini LT
- C. Half Cell Potential Equipment - CORMAP 1
- D. Surface Resistivity Meter - PROCEQ Resipod



Digital Shear Testing Machine



Compression testing machine



Triaxial Testing Machine



Permeability Testing Equipment



Consolidation apparatus

Ms. Aswathy Praveen Kumar



Qualifications: M.E. (Construction Engineering and Management)

Work Experience: Lab Instructor, BITS Pilani Dubai Campus (2017 – To Date)

Teaching Faculty, Vidya Academy of Science and Technology,
India (2015)

Expertise in: Instruction of labs - Surveying, Transportation, Soil Mechanics,
Engineering Graphics, Concrete materials and Technology lab,
Strength of materials Lab, Handling all civil laboratory equipments

Work done: Instruction in labs, Organization of all civil laboratory related works

Software knowledge: Autocad, Staad Pro

