

Workshop on
EARTHQUAKE RESISTANT PRACTICES FOR
UNDERGRADUATE STUDENTS OF ARCHITECTURE

July 04 - 09, 2011, IIT Kanpur

National Information Centre of Earthquake Engineering (NICEE) at IIT Kanpur is committed to furthering earthquake safety in the built environment through empowering stakeholders in the building delivery process by information sharing and dissemination of the state of the art in earthquake engineering. NICEE has also actively engaged in awareness, sensitization and training programmes for faculty in architecture and civil engineering disciplines in colleges all over India through the NPEEE program that was in operation from 2003 till 2007. The National Advisory Committee of NICEE unanimously felt need of targeting the architecture professionals of tomorrow by offering training modules to the students of architecture in colleges all over India. The objective of this workshop was primarily aimed to equip the participants with the necessary expertise to arrive at architectural designs that are inherently adequate in resisting earthquake loads at a conceptual level.

To meet this objective, a pilot Workshop for Undergraduate students of Architecture in Earthquake Resistant Design Practices was first offered in 2008. The workshop was a grand success and it was decided to make it an annual event. The 4th National Workshop was held in IIT Kanpur during July 04-09, 2011, in which 58 undergraduate students who had completed six semesters of studies in their respective architecture programmes, from 17 institutes representing 16 cities from all over India participated in the 6-day workshop. The participants were selected from around 120 applications received.

Workshop 2011

The general objective of the workshop was to sensitize the students to earthquake safety issues and in capacity building in the basics of earthquake resistant design at a conceptual level. It was expected that lectures and hands-on studio sessions in tackling a design assignment will help students in internalizing earthquake resistant practices as an integral part of their design decision making. The resource faculty for this workshop came from architecture and structural engineering disciplines in an attempt to recreate as closely as possible real life architectural practice. The selected participants were each sent a NICEE publication titled “Architectural Teaching Resource Material on Earthquake Design Concepts” authored by Murty and Charleson. The participants were advised to go through the book before coming for the workshop.

The following faculty members, Prof. Keya Mitra, Department of Architecture, Bengal Engineering & Science University, Shibpur; Prof. Mahua Mukherjee, Department of Architecture & Planning, IIT Roorkee, Roorkee; Prof. Vasudha Gokhale & Prof. Meera Shirolkar, Dr. B.N. College of Architecture for Women, Pune; Prof. Atanu Dutta, Department of Civil Engineering, Jorhat Engineering College, Jorhat; Dr. Koustubh Dasgupta, Department of Civil Engineering IIT Guwahati and Architect Sushmita De were the resource persons of the workshop 2011.

Design Problem

The design brief was to Design a housing project in a hypothetical 150m x 80m site in Guwahati, located in Seismic Zone V. The workshop participants were divided into 2 member groups where each member was from a different institute. They were asked to develop a design proposal which should be rational in functional, structural and aesthetic terms. While the participants were encouraged to adopt innovative design approaches, the objective of this design exercise was to evaluate their understanding of earthquake resistant architecture and application of the same in a design project.

Evaluation of Design

Six designs that incorporated earthquake resistant features without compromising the host of other requirements such as functionality, climate, etc. were shortlisted during the initial round by jury. The jury consisted of following members:

Prof. Mahesh Tandon, CMD, Tandon Consultants & Private Limited, New Delhi
Dr. A.K. Mittal, Retired Structural Engineer from CPWD
Ar. Balbir Verma, Former President IIA and Practicing Architect, New Delhi
Prof. Amit Bose, DDF Consultants, New Delhi

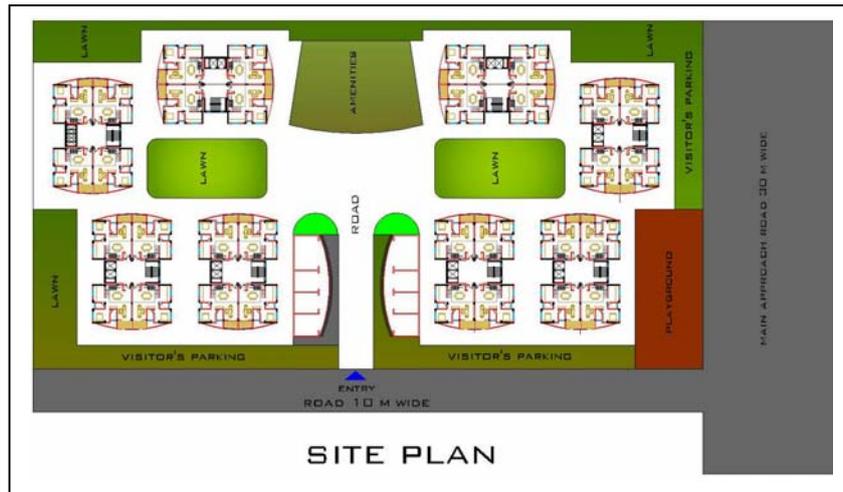
The jury looked particularly for a clear understanding of structural system that would be effective in withstanding earthquake loads. The award winning designs are appended below.

First Position

Mr. Anand Gopal, National Institute of Technology Patna
Mr. Mayur R. Mundada, BKPS College of Architecture, Pune

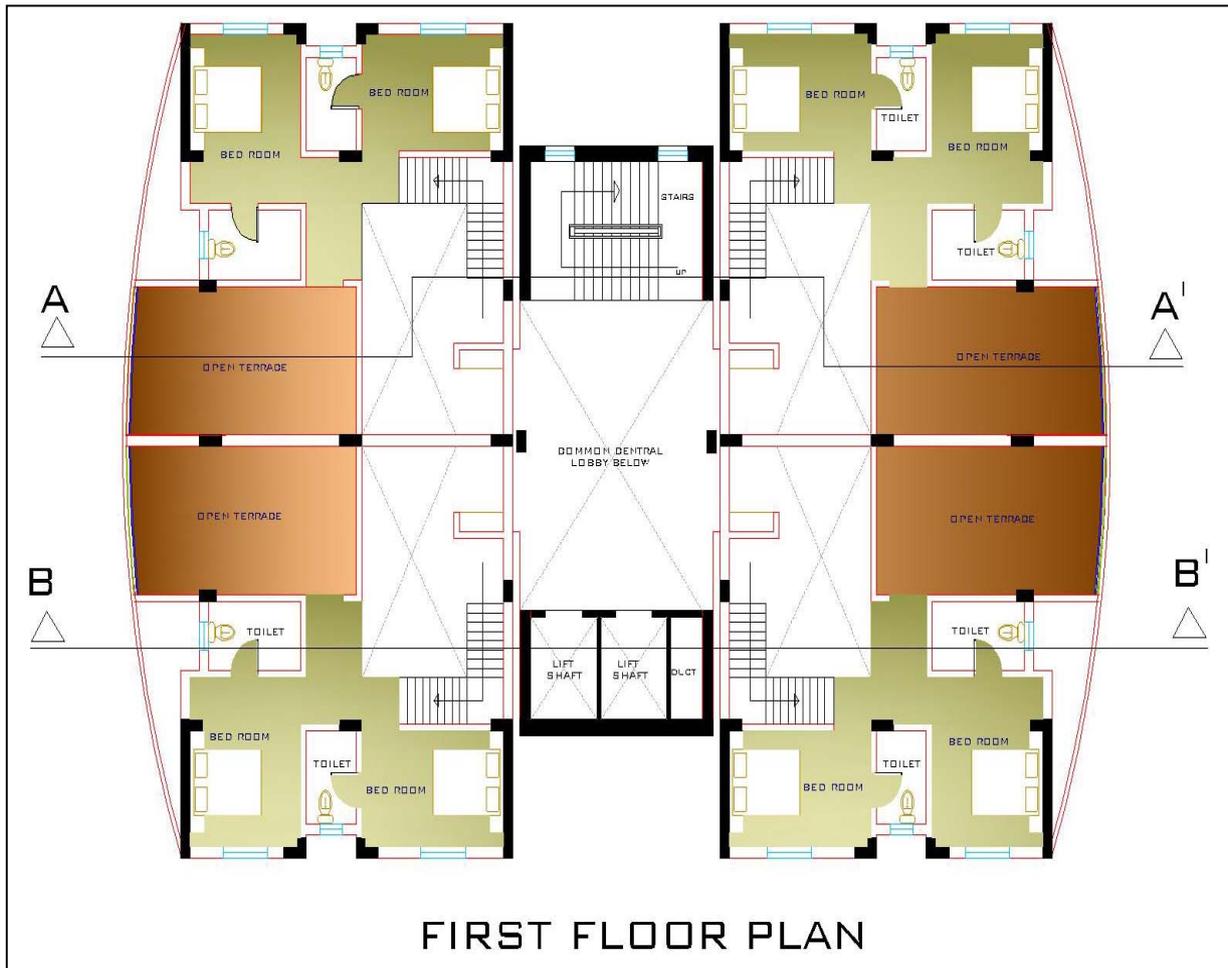


Figure 1: View of the proposed housing



The first prize winning design has integrated 3 blocks with regular configurations and separated by seismic joints to arrive at the final plan footprint. There is a good balance between the RCC shear walls and the moment resisting frames in the two orthogonal directions for withstanding earthquake induced forces in the building. The structural system is rational with excellent integration with the functional use of the spaces. The design also integrates some element of aesthetic interest through the curved balconies, without compromising the structural integrity.

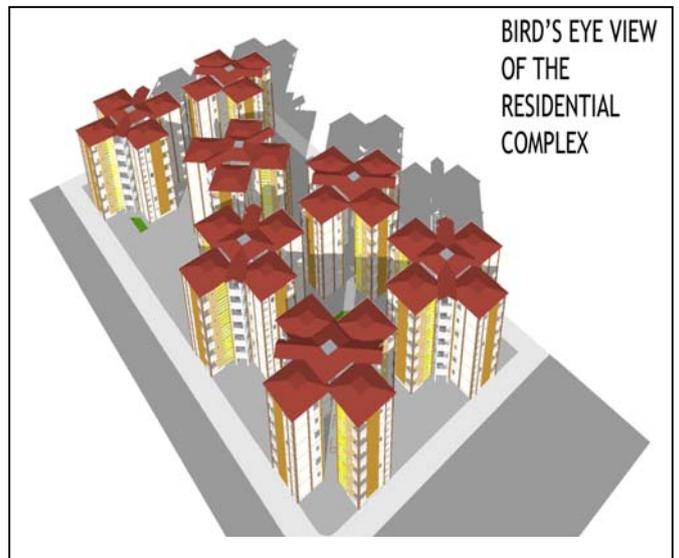
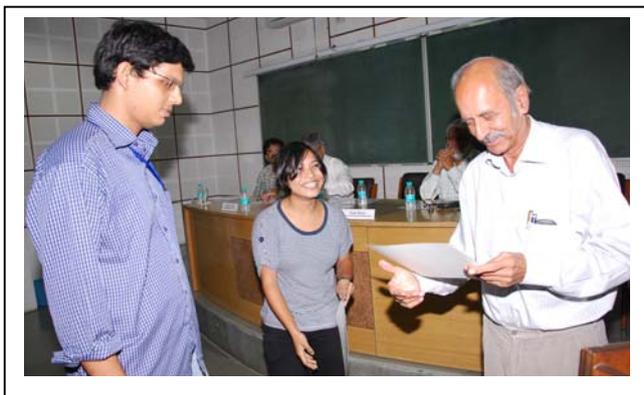




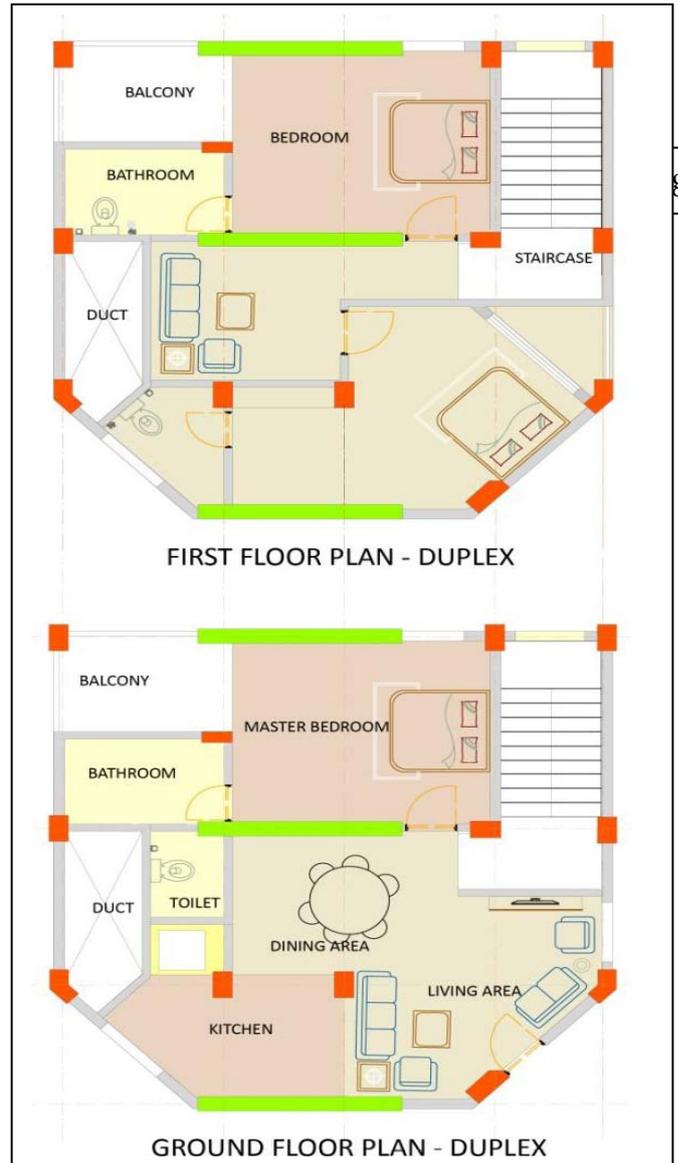
Second Position

Ms. Priyadarshini Maity, MANIT, Bhopal

Mr. Bhavin Kantilal Patel, Sir J.J. College of Architecture, Mumbai



This design solution uses a cross shaped configuration and resolves the problem of reentrant corners by providing chamfered faces at all four intersections of the two arms of the cross. The lateral load resisting system in both directions is through moment resisting frames. With three sides open, the apartments have adequate natural light and ventilation pointing to the climatic responsiveness of the design.



8

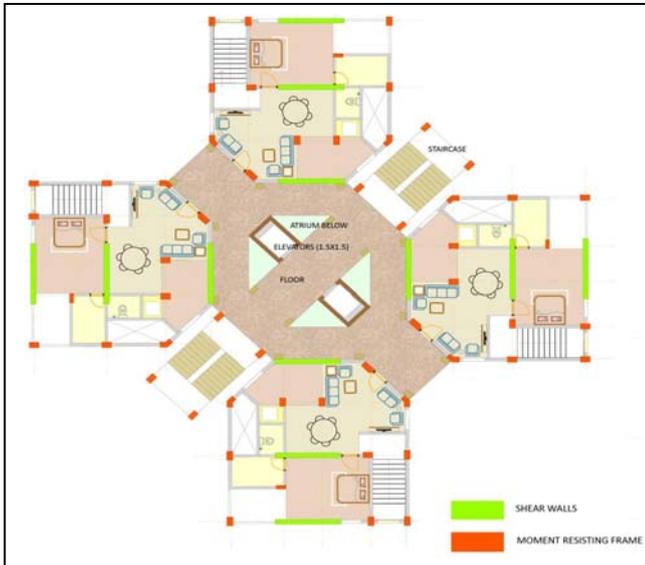
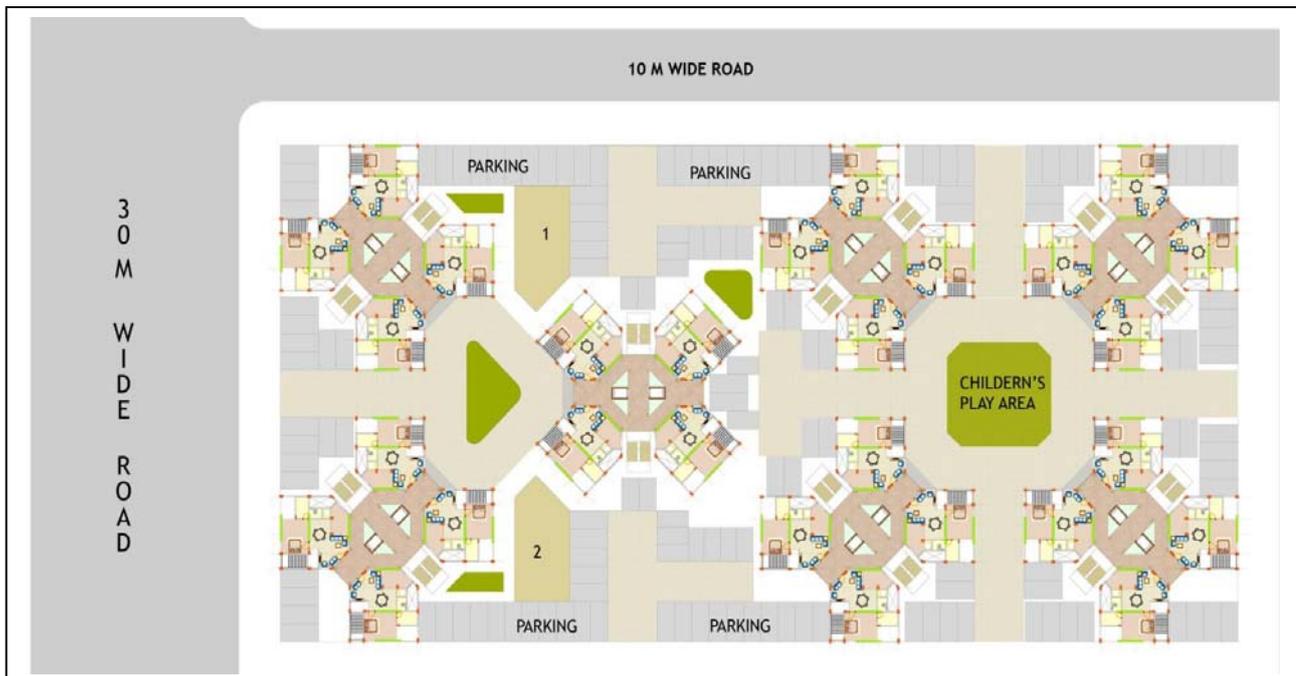


Figure: Floor Plans Duplex

Figure: First and Ground Floor Plans Duplex

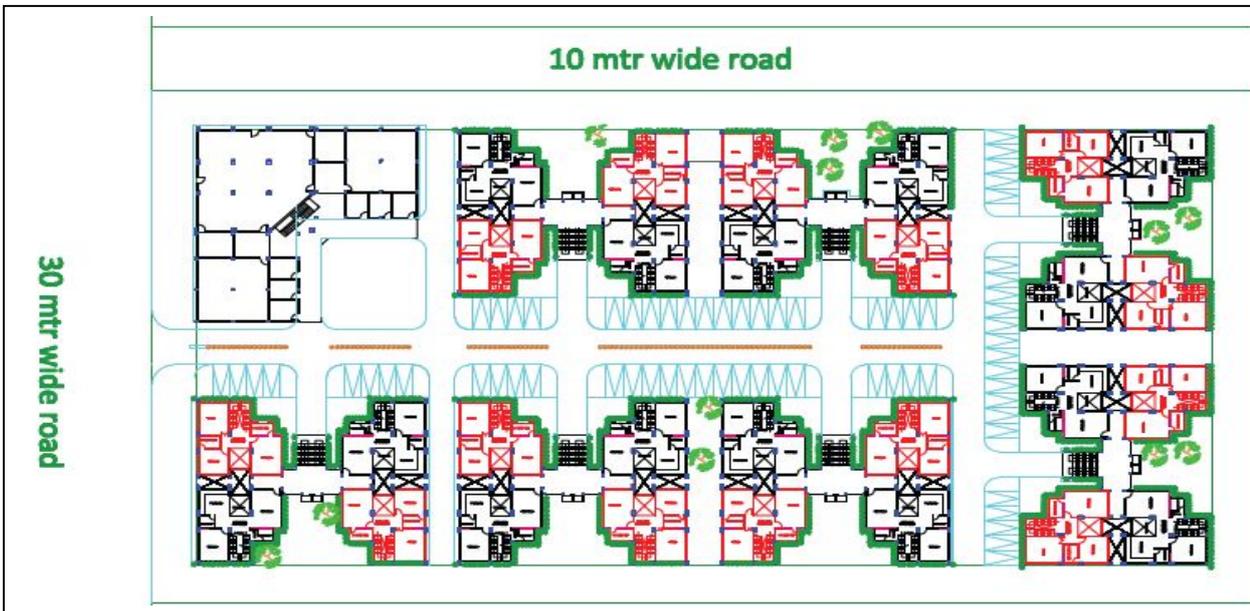


Third Position

(1)Mr. Shivam Sohani, MANIT, Bhopal
Mr. Hemant Kumar, VNIT, Nagpur



Figure: View of the Perspective housing



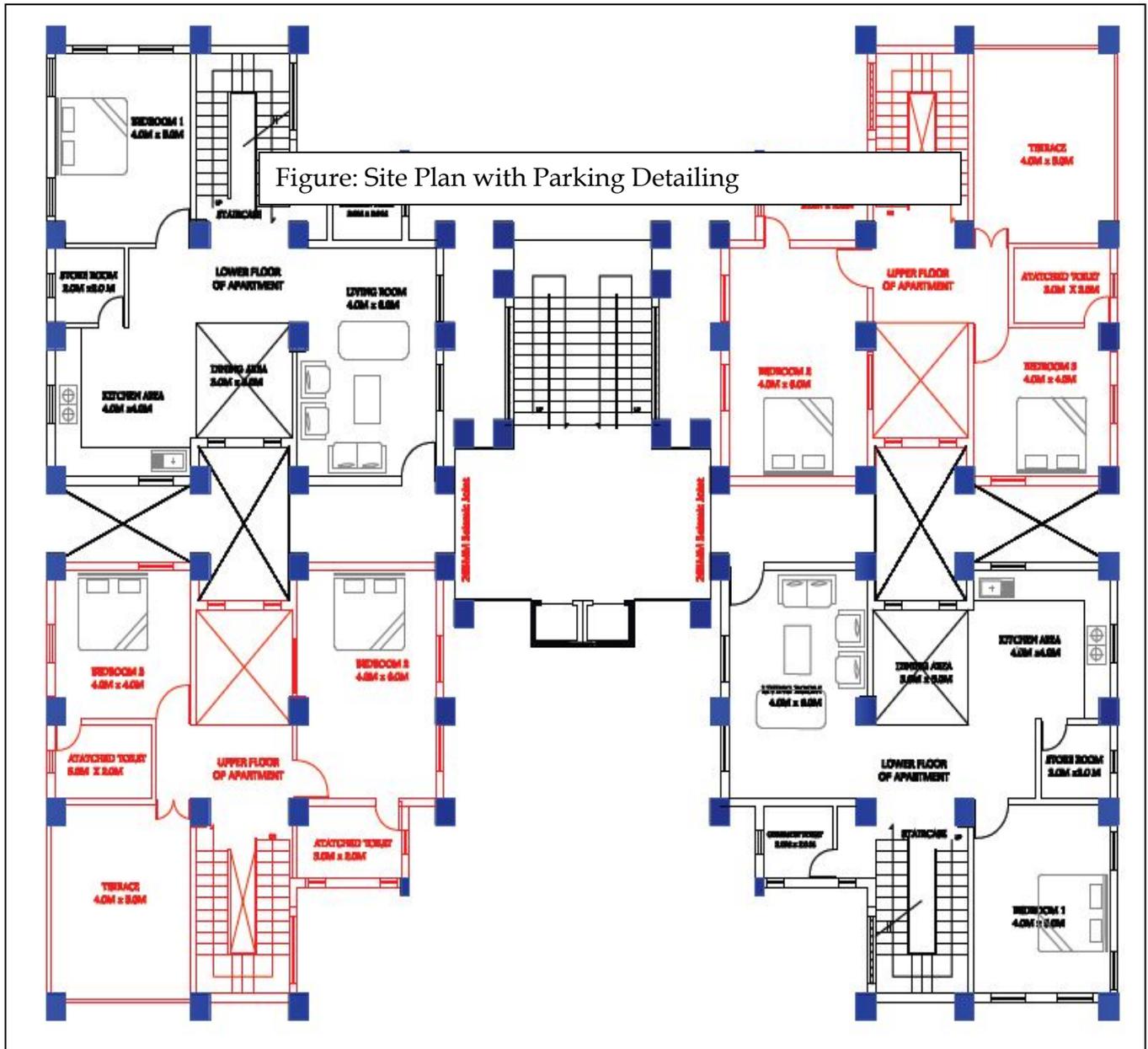


Figure : Architectural Layout of a typical floor plan 1

This design solution adopts a somewhat irregular plan configuration using moment resisting frames in both directions for lateral loads. To mitigate the effects of reentrant corners in the plan, it is divided into simpler geometrical units by providing seismic gaps between the individual blocks.

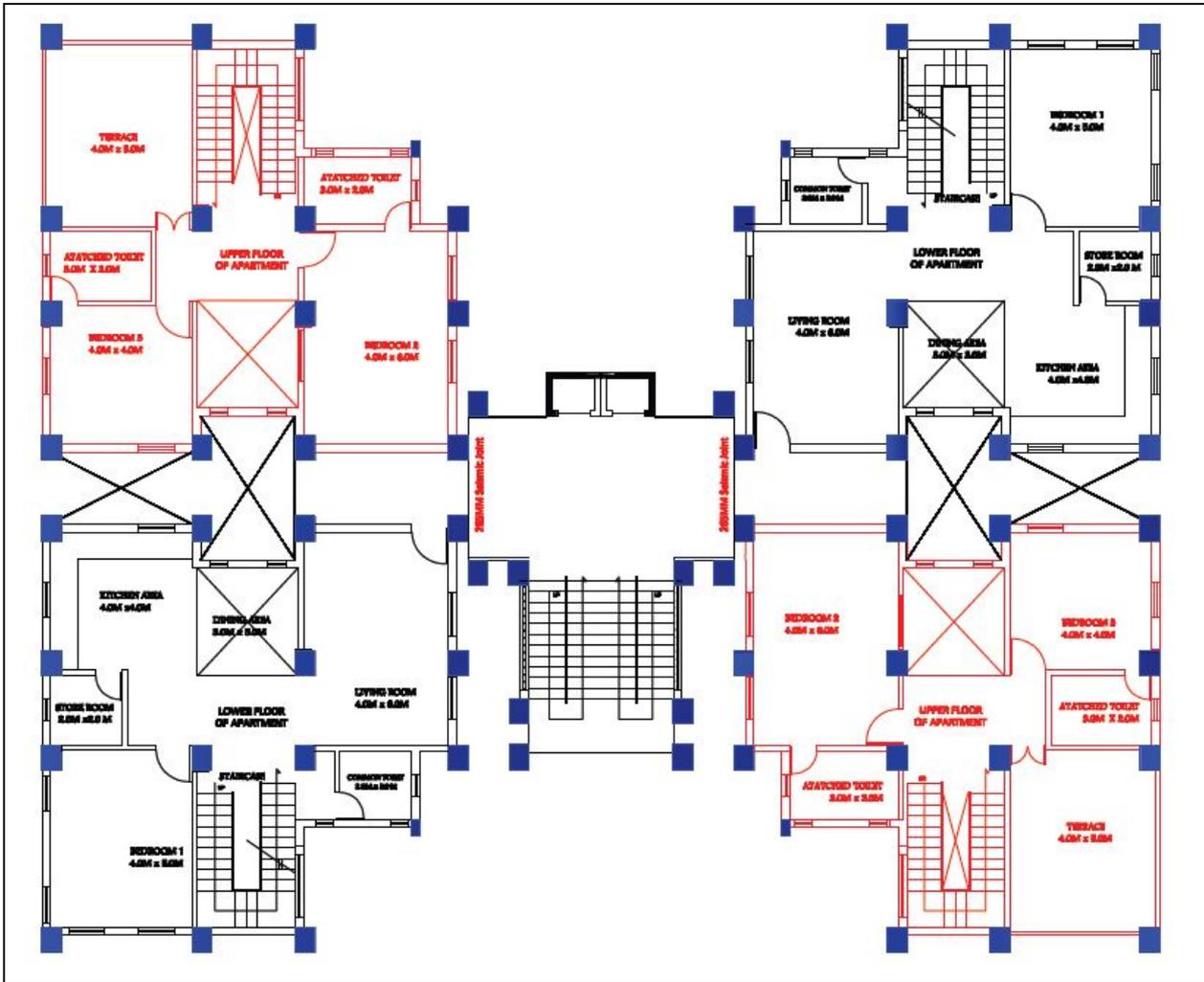


Figure : Architectural Layout of a typical floor plan 2

Third Position

(2) Mr. Rishi Gaurang Vora, Academy of Architecture, Mumbai
 Ms. Shachi Bahl, Manipal School of Architecture & Planning, Manipal
 Ms. Divita Dugar, MNIT, Jaipur





Figure: View of the Perspective housing



Figure: Site Plan Ground Floor (Single Unit)

This design solution adopts RCC shear walls and moment resist frames for resisting earthquake induced forces. The apartment units use a simple plan configuration with no reentrant corners or other irregularities. The plan configuration displays excellent balance between a simple structural solution and a functional and efficient architectural plan. The single units are joined using a simple geometric approach. Simplicity and functionality are the key attributes of this design solution.



Figure: Ground Floor (Double

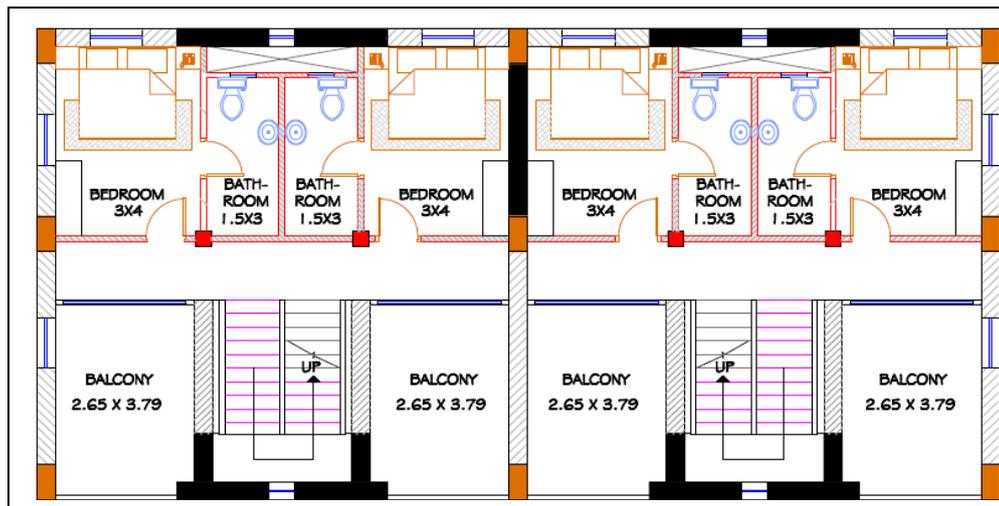


Figure: First Floor (Double Unit)

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