SWS
SUMMER WINTER SCHOOL

PLANNING AND DESIGN OF CONFINED MASONRY BUILDINGS IN EARTH-QUAKE-PRONE AREAS OF INDIA

Svetlana Brzev | Vivek Rawal

COURSE NUMBER
S16FT002

CREDITS
5

FEES
Rs. 27,500/-

DATES
9th May to 21rst May

DURATION
13 Days

NO. OF STUDENTS
25

OPEN FOR PROFESSIONALS
Yes

PREREQUISITES FOR PROFESSIONALS
Architectural and Engineering diploma and degree holders

FEES FOR PROFESSIONALS
Rs. 34,375/-

PREREQUISITES FOR STUDENTS
Basic knowledge of Architectural Planning (UG 3rd year onwards and PG)

LOCATION
CEPT Campus

EXPENSE
Nil

STUDENTS DELIVERABLES
Posters, Reports

FACULTY OF TECHNOLOGY

/CEPTSWS

Image Source: Course Faculty

Dr. Svetlana Brzev is a Canada-based structural engineer with 30 years of consulting and academic experience related to design of reinforced concrete and masonry structures and is currently a visiting Professor at IIT Gandhinagar. In 2007 she has authored the first Indian monograph on confined masonry. She holds B.Eng. and M.A.Sc. degree in Civil Engineering from the University of Belgrade, Serbia, and a Ph.D. degree in Earthquake Engineering from the University of Roorkee.

Ahmedabad-based architect **Vivek Rawal** has more than 25 years of experience working with communities in India and abroad on issues of social housing, sustainable technologies and disaster-resistant construction. He is currently advising UNDP on owner-driven reconstruction process after the 2015 Nepal earthquake.

Looking at immense scale of devastation and loss of human life in recurring disasters in various parts of the world, one of the key area needing attention is how to make our buildings disaster -resistant. The use of modern reinforced concrete (RC) building technology consisting of frames with masonry infill walls poses a challenge when adequate design expertise and construction quality assurance are not available. These design and construction flaws have resulted in significant human and economic losses in earthquakes in many countries, including Bhuj, Gujarat (2001) earthquake and the recent Gorkha, Nepal earthquake (2015). There is a need to explore alternative construction practices, such as confined masonry, which can be implemented even under unfavourable field conditions. Confined masonry buildings have performed very well in damaging earthquakes in many countries, including Mexico, Chile, Peru, Indonesia, and Iran. This technology is currently not widely used in India, although the first large-scale, engineered application was recently completed with 36 confined masonry buildings at the new IIT Gandhinagar campus in Palaj Village, Gadhinagar (http://www.iitgn.ac.in/sites/default/files/ConfinedMasonry.pdf). The project also received HUDCO award recently for using this technology. Confined masonry is a construction technology which offers a safer alternative to both RC frames with masonry infills and unreinforced masonry construction in seismically prone areas. The key components of a confined masonry building are masonry walls enclosed by horizontal and vertical RC confining elements, which look similar to beams and columns in a RC frame building. However, a confined masonry building acts like a composite masonry & RC wall system which resists both gravity and lateral loads and is substantially different from RC frame system. This course is intended for architects and other professionals interested in learning the key concepts of confined masonry construction, architectural planning and simplified seismic design approaches for confined masonry buildings.

PLANNING AND DESIGN OF CONFINED MASONRY BUILDINGS IN EARTHQUAKE-PRONE AREAS OF INDIA

WORK PLAN

Day no.	Date	Description	Methodology	Location
Day 1	9-May-16 (6 hours)	Overview of historical and modern masonry construction technologies; similarities and differences between reinforced concrete and masonry technologies; key components of confined masonry technology;	Lecture	CEPT
Day 2	10-May-16 (8 hours)	Principles of earthquake-resistant design; earthquake ground motions; how earthquake forces are developed and transferred through a building; how individual building components resist earthquake forces; A simplified explanation of Indian code for earthquake-resistant design IS1893;	Lecture	CEPT
Day 3	11-May-16 (8 hours)	Architectural planning; site selection; selection of building plan size and shape; key principles of architectural planning for satisfactory earthquake performance;	Lecture	CEPT
Day 4	12-May-16 (4 hours)	Key properties of materials in a confined masonry building; minimum material quality requirements for safe buildings;	Lecture	CEPT
Day 5	13-May-16 (8 hours)	Visit to the IIT Gandhinagar campus (first large-scale application of confined masonry in India) and discussion with architects and engineers;	Travel	IITGN Campus, Palaj, Gandhinagar
Day 6	14-May-16 (6 hours)	Design of confined masonry walls; size and spacing of confining elements; wall density; construction and detailing do's and don'ts;	Lecture	CEPT
	15-May-16	Break (no classes)		
Day 7	16-May-16 (6 hours)	Planning of confined masonry buildings for earthquake resistance – case studies (bungalow; low-rise apartment building)	Lecture	CEPT
Day 8	17-May-16 (6 hours)	Design project of a confined masonry building – Day 1	Studio	CEPT
Day 9	18 May 2016 (6 hours)	Design project of a confined masonry building – Day 2	Studio	CEPT
Day 10	19 May 2016 (6 hours)	Design project of a confined masonry building – Day 3	Studio	CEPT
Day 11	20 May 2016 (8 hours)	Design project of a confined masonry building – Day 4	Studio	CEPT
Day 12	21 May 2016 (8 hours)	Project presentations	Studio	CEPT