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The Remaking of Mumbai (II)

A CTBUH–IIT Educational Design Studio

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Written by Antony Wood, CTBUH Executive Director/Illinois Institute of Technology

The CTBUH–IIT 2010 spring semester student design project undertaken between January and May 2010 was a continuation of the 2009 studio, thanks to the continued sponsorship support of the Remaking of Mumbai Federation (for a full description of last year's studio and the resulting design responses, see CTBUH Journal 2010 Issue I). Once again, 12 advanced architectural students from the Illinois Institute of Technology and I set out from the white frozen landscape that is January in Chicago, to the riot of color, sound and smells that is Mumbai at any time of the year!

Once there, we had a week of studying the historic C-ward district of the Indian city (for an insight on this area, and Mumbai generally, see the report of last year's fieldtrip, in CTBUH Journal 2009 Issue I), and collaborating with the students of Sir JJ College of Architecture in seeking to understand the city and Indian culture. This year, the students also attended the CTBUH 2010 World Conference, "Remaking Sustainable Cities in the Vertical Age," which was happening in Mumbai during our visit, and thus had the opportunity to hear from such luminaries as Charles Correa, Ken Yeang and William Baker. Some of these presentations were clearly to have an influence on the design schemes to follow, as was also the influence of infamous French skyscraper-climber Alain Robert who also spoke at the event (read on).

Unlike last year, where we worked across five adjoining sites in the C-ward and developed a combined scheme for a linked vertical city of the future (see image of last year's scheme below), this year each pair of students developed a different scheme for the same site, which was located closer west to the Arabian Sea/Marine Drive, in close proximity to the Marine Lines railway terminus. It was thus interesting to see the differences between the six resulting projects for the same site, though all were inspired by the same motivation to create tall buildings beyond the largely commercial or sculptural approaches that predominate around the world today: tall buildings that relate physically, environmentally and culturally to place.

The resulting collaborative design scheme from last year's Mumbai studio (2009), with five linked towers suggesting a vision for the future (See CTBUH Journal 2010 Issue I, p. 22–33)

Many of the projects this year were inspired particularly by the sustainability implications of land use and how to incorporate "horizontal" land-consuming functions vertically in the sky, thus challenging the limited traditional functions of office, residential, hotel which predominate in tall buildings. The end results were thus one that require a projection into the future for the viewer, based on the overarching theme that the dense, vertical cities of the future need to become much more radical and intensified in all aspects – energy use, function, form and connection to name but four – than they are currently.

Moksha Tower – Vertical Cemetery

Mumbai's horizontal density leaves little room for the living, let alone the dead.

Traditional cemeteries take up significant areas of land. In a city like Mumbai, where there is precious little landscaped space for everyday urban usage and recreation, it is ironic that these cemeteries take up significant open

Mumbai Skyline © Seth Ellsworth

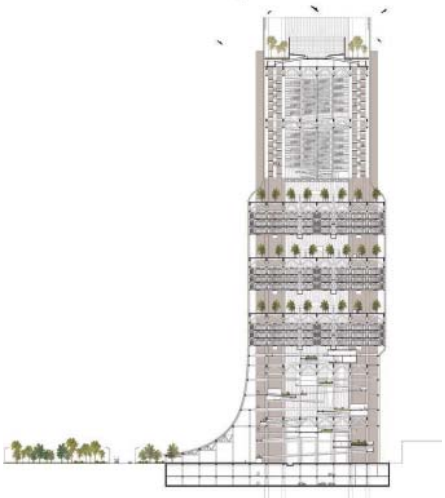
IIT students' in collaboration with students from Sir JJ College of Architecture © Mark Swingler

IIT student with C-Ward skyline in the background © Seth Ellsworth

space right in the city center, but are used by very few (living!) people at any given time. Such a significant cemetery currently exists adjacent to the project site, and the Moksha Tower design thus proposed to incorporate the existing graves into a new "vertical cemetery" in the sky, which would also accommodate the departed in the future.

This cemetery is divided into four zones according to the four predominant religions in the area: Hindu, Muslim, Christian and Zoroastrian (Parsi) – with the traditions and customs of burial/cremation influencing the detailed design of each zone. Thus in the Hindu zone, the processes are primarily of cremation, whereas in the Muslim and Christian zones above, the bodies are buried. In the Muslim zone the bodies are buried below the conceptual "ground" created, and thus one descends on hydraulic platforms below the landscaped plane to visit the burial crypts. In the Christian zone the bodies are stored above the conceptual "ground" created (very much in the spirit of the European stacked cemeteries seen commonly in Greece or Spain) connected by a series of ramps. Perhaps the most evocative – though smallest – zone is that for the Zoroastrian community at the top of the building where, according to their traditions, vultures pick the bones of the dead clean in the funerary tower (in this modern age, assisted by solar-photovolatic-induced decay of the bodies).

Moksha Tower (Vertical Cemetary) – Yalin Fu and Ihsuan Lin, 2010



The expression of the building is very much one of a cemetery swept vertically, with the façades of the building – stretched between the four, separate corner circulation cores – representing the horizontal landscape plain of a typical cemetery through which the bodies are inserted, now turned through 90 degrees. These full-height vegetated walls also have major climatic benefits to both the building and city, through helping condition the (largely open) internal areas, reduce heat island effect, etc. The internal spaces – including significant public green spaces – provide for funeral, memorial and reflection as with a traditional cemetery.

The proposition is clearly a radical one, but would bring back the adjoining cemetery

park for everyday usage, and serve as a prototype for other vertical cemeteries. The idea is perhaps not as far-fetched as might appear with a 14-story vertical cemetery already built and in use in Santos, Brazil. Of course the politics/social implications of moving existing buried bodies would need to be addressed, as would the issue of the length of time that the bodies could be housed, so that the cemetery does not become eventually full, as in a traditional cemetery, which would defeat the principles on which the project is based.

Khel Tower – Vertical Athletic Center

United States swimmer Michael Phelps won more Olympic gold medals at the single 2008 Olympic Games than the country of India has won in their 22 years of Olympic competition.

Khel Tower (Vertical Athletic Center) – Kent Hoffman and Mark Swingler, 2010

This project has a similar starting point to the Vertical Cemetery in that many sports require significant horizontal space for their activity, which means they do not typically lend themselves to being accommodated in tall buildings. In this scheme, however, the sports are accommodated through a series of indoor arenas (with external grassed "pitch" areas on the roofs) which are supported horizontally at different heights between the six vertical towers. Two of these towers are plumb vertical and handle the primary vertical circulation for the whole scheme, but the other four hotel towers lean out past each other, giving views of the ocean on either side past adjoining towers from all hotel rooms. Structurally, the sporting "bridges" also tie together the leaning towers.

The intention is that the whole complex of towers and sporting venues could be occupied by differing sports for a period of time, for example the visiting "David Beckham School of Soccer" or the "World Judo Championship", where the hotel rooms, bridges and terraces become the "arena" for the sports training and activities happening at myriad levels. The ground floor is raised up for car parking submerged within a peripheral ring of public/retail facilities, with one large pitch for cricket or soccer at this podium level. A public route through the entire complex links all the sports levels vertically and horizontally, and a massive rock-climbing wall reaches out from the main lobby to traverse across and up the towers (perhaps here is the influence from the Mumbai Conference of the French spiderman!).

The project aims to bring a multitude of sports right into the heart of the city, and become a spectacle, not only for those staying there but for city inhabitants overall and young people in particular, some of whom may be inspired to be the Michael Phelps or Imran Kahn of the future.

Urban Ark – High-rise Endangered Animal Habitat

India's Bengal tiger population has fallen by 50% since 2003.

Again, the theme here is both land-use and social. The only zoo in Mumbai is currently located way out beyond the city and is poor in both facility and resource. What chance do the 60% of Mumbai's inhabitants who currently live in slums in the city have of seeing significant animals in their daily existence, and perhaps appreciating some of the pressures that rapid urbanization place on the fauna and flora of a developing country? At the same time, it is unrealistic to expect that a significant animal reserve – with the horizontal land space needed – could be brought into the heart of the city, unless that reserve can be somehow brought into the vertical realm.

This project thus looks to work with some of India's endangered species – the Bengal Tiger, Ganges River Dolphin, Asian Elephant, Indian Rhinoceros, White Rumped Vulture, etc. – and create habitat for their preservation, study and understanding. The complex houses many of the spaces and functions of a typical zoo or animal habitat, such as conservation and education, as well as viewing. The horizontal ground space is lifted up to accommodate car parking and the podium top maximized for habitat, and a public route traverses and connects the differing animal habitats. Two of the four towers are predominantly for vertical circulation (for both people and animals, though the façades are hydroponic vertical farms producing agriculture for consumption by the animals), and the two larger towers house support functions in between the habitat levels. The overall effect would be, once again, a major spectacle in the city, with

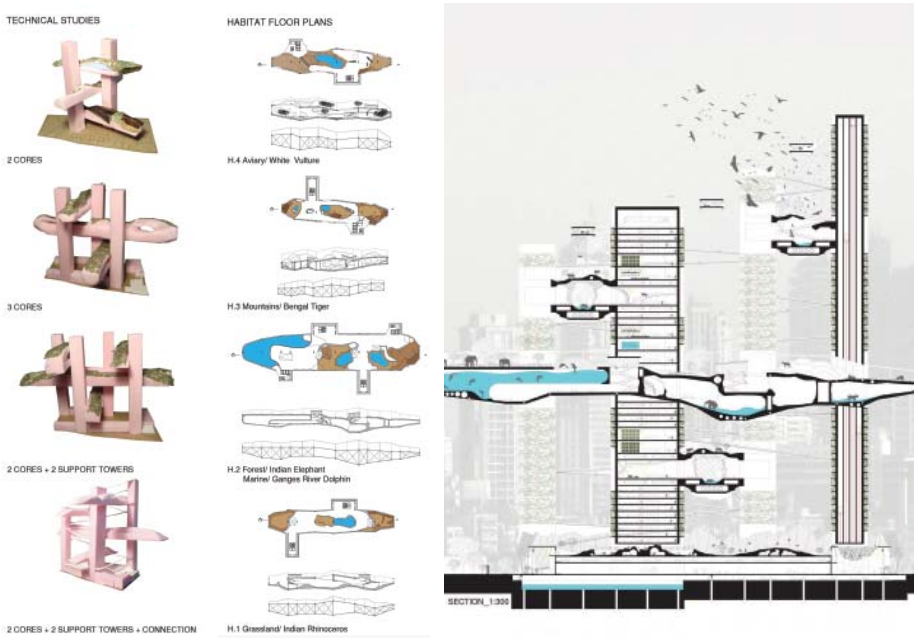
animals contained at differing heights for all in the city to view from far and wide. The scheme also introduces significant green space into the city, improving air quality and providing a place for recreation.

TATA Tower – Urban Development of the TATA Corporation

By the year 2030, 20% of the land area of Mumbai will be occupied by parked or moving cars.

This project investigates issues of land use, as well as Mumbai's perhaps biggest problem: traffic congestion and pollution. Exacerbated geographically by being a thin peninsular of land with the main business district to the southern tip, travelling by road in the city is currently a nightmare. And, with precious little public transport infrastructure other than the massively-overcrowded trains, it is a nightmare endured by millions every day. In addition, the relationship between car parking and tall buildings the world over has never really been satisfactorily resolved – usually handled as either being housed in a separate building, or located at the base of the tower where the car parking disconnects the tower and its inhabitants from the vital urban grain (not to mention creating an aesthetic eye sore at the ground plane).

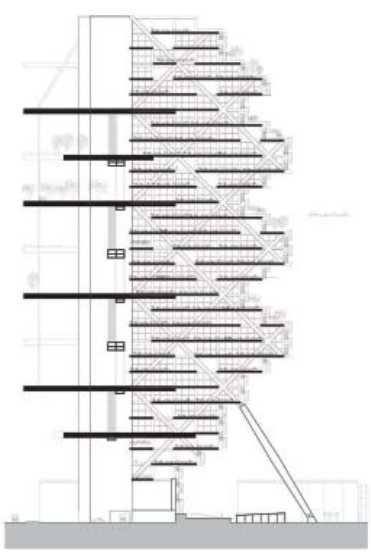
This project looks to the future, to a time when the TATA Corporation (India's seminal car manufacturer, famous for the recent creation of the $2,500 Nano car) creates the electric/bio-diesel smart car which is efficient in both parking space and energy consumption. The project – a residential community for TATA Corporation employees – creates a curvaceous group of linked towers, where the cars can vertically travel up the external cores via electromagnetic platforms, to be parked, according to the western ideal, in one's back yard. The building also becomes a parking resource for neighboring towers, which may become linked by pedestrian sky bridges in the future. The cars are discharged out beyond the site through elevated slipways, and access the vertical cores at either below ground or above ground level, thus freeing up space for a pedestrian oriented ground plane.



Urban Ark (High-rise Endangered Animal Habitat) – Malik Ajose and Saul Moreno, 2010

The towers become part power-plant, creating electricity or bio-diesel to fuel the cars, via largely solar harnessing on the south, east and west (photovoltaic louvers), wind to the north (building integrated wind turbines capturing the winds from the sea), and algae farming on the roof (for the bio-diesel). Significant communal and urban space is also created amongst the bridge links and terraces between and around the towers. Thus the solution, though futuristic, addresses some of the current problems of Mumbai in the significant land area taken up by cars, the energy driving them/pollution emitted from them, and the relationship between parking and the tower. Of course this could not

TATA Tower (Urban Development of the TATA Corporation) – Seth Ellsworth and Jayoung Kim, 2010



Nirashray Tower (Homeless Tower) – Nashrah Noor and Amee Sonani, 2010

work without an integrated plan for non-car based public transport in the city; though, even then, people occupying residential towers in the city (as opposed to office function, where people can travel by public transport as in many cities of the world) will always want/need a space to park their cars.

Nirashray Tower – Homeless Tower

In Mumbai, nearly 60% of the population lives in slums, in inadequate housing or are homeless.

Homelessness in Mumbai is evident throughout the city. Entire families sleep on the street at night and live under tarps during the day. Many of the city's homeless are immigrants from rural areas, who have migrated to Mumbai hoping to find work and a better life in the city. This project provides an infrastructure where these people can transition from rural to urban, living in a building with basic provisions and using their skills to get on their feet, earn a modest income and improve their situation.

The scheme is comprised of three towers, each containing small living units created from lightweight glass-reinforced-plastic modular shells, which sit within the structural framework. Each "shell" can be personalized according to the occupants, though it is expected that this accommodation would be available on a temporary basis, e.g., up to a maximum of six months. This modular housing and structural system allows for a flexible number of units so the building can meet current homeless demands (some modules can be combined together). The washing and cleaning facilities are communal.

The crux of the scheme is the significant open space around the living spaces and between the towers, where the inhabitants can utilize their rural skills to help them earn a modest income. Predominantly these terraces provide space for agriculture, but can also be used for multiple cottage industry trades and crafts. The terraces provide 187% of the site area as agricultural land in the sky. The ground level is occupied by a market where much of the agricultural produce and crafts can be sold. Support spaces are also provided, including training to provide useful skills which allow residents to obtain jobs within the city and become self-sufficient.

Jalaashay Tower – Reservoir Tower

Mumbai faces a shortage of 250 million liters of water daily, and yet the city annually floods catastrophically from monsoon rains.

This dichotomy between, on the one hand, drought, and the other hand, flood, is the starting point for this project. This situation will only get worse in Mumbai – surrounded on three sides by ocean – as Monsoon rains increase and sea levels rise with climate change, and yet basic infrastructure for clean water provision in the city cannot keep pace with the growing population.

The Jalaashay Tower acts as a prototype for water collection, filtration and storage. The site is dug out and conceived as a low level "sink" which would take much of the flood water in monsoon time (the edge conditions of the site acting as filter to the water) which is then pumped up the tower for filtration and storage as a vertical reservoir. This reservoir serves the needs of the residential community that occupy one half of the tower in stepped three-story villages, all of which have access to a communal garden on the roof of the adjoining village. These residential blocks are cantilevered out from the main vertical structure and take advantage of the weight of the water storage, which anchors the scheme down on the other edge of the main vertical structure. The water in these reservoirs is

...Reykjavik

> "Reykjavik's new high-rises have become a symbol of everything that is wrong with Icelandic architecture in Iceland. They are regarded as the physical embodiment of the money-driven society that collapsed, and are the favorite images used by the Icelandic media to illustrate the crisis."
>
> *Daniel Golling, journalist for A10 magazine, on Höfðatorg Tower, Reykjavik. From "Symbolic Architecture", A10, Jul/Aug 2010.*

purified through a system of "living machines": the roofs of the reservoirs become public gardens all linked together via a continual "ecological corridor" of escalators, tying the gardens with the ground plane and enabling migration of species (flora and fauna) throughout the tower. Thus the scheme has a clear public side – with recreational gardens in the sky looking out on the ocean in one direction – and a private side, with tower-community gardens looking out on the ocean in the other. The ground floor reservoir would also act as a recreational resource for the local community, with boating/kayaking activities, etc. More than this though, it also becomes a crisis center/resource when the area periodically floods, with the kayaks available for emergency movement throughout the flooded area. ■

Acknowledgements

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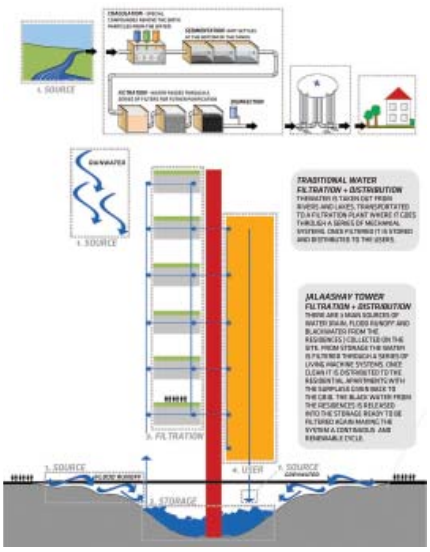
Tutors/reviewers: Matthew Herman – Buro Happold (Environmental Tutor); Rebecca Ulaszek – SOM (Structural Tutor); Alphonso Peluso – IIT/Vertex Architecture; Chris Rockey – IIT/Rockey Structures; Sagree Sharma – Arup; Mahender Vasandani – M Square Urban; and Jan Klerks – CTBUH.

Above all, I would like to thank the student themselves: Yalin Fu and Ihsuan Lin - Moksha Tower, Kent Hoffman and Mark Swingler – Khel Tower, Malik Ajose and Saul Moreno – Urban Ark Habitat, Seth Ellsworth and Jayoung Kim – TATA Tower, Nashrah Noor and Amee Sonani – Nirashray Tower, and Bojana Martinich and Teodora Vasilev – Jalaashay Tower.

The 2011 CTBUH–IIT High-rise studio will be taking place in Seoul, Korea, with the kind support of Daelim Construction.



Jalaashay Tower (Reservoir Tower) – Bojana Martinich and Teodora Vasilev, 2010

The professional community survey the final result at the annual IIT College of Architecture Open House

Professor Wood (CTBUH/IIT) and Chris Rockey (IIT/Rockey Structures) reviewing the TATA Tower design

Jan Klerk (CTBUH), Rebecca Ulaszek (SOM), Alphonso Peluso (IIT/Vertex Architecture), and Mahender Vasandani (M Square Urban) reviewing the Jalaashay Tower design