GRADUATION PLAN

Patrick Hendy S. Lim

4184351

Supervisors:

Darrel Ronald

Tanner Merkeley

TU Delft

MSc 3/4, Materialisation

Tall Graduation Lab

Tall Building Design Vertical Cities Europe

2012/2013

GRADUATION PLAN

MSc 3/4, Materialisation

TU Delft – 2012/2013

A. Personal Information

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B. Studio

Theme : Tall Graduation Lab
Tall Building Design Vertical Cities Europe

Teachers : Darrel Ronald, Tanner Merkeley

C. Title

Title of the graduation project:

"Sky Inner-Courtyard Towers"

D. Product

1. Problem Statement

Design assignment:

This graduation project is about designing a complete district of mixed functions and embeds it into the urban pattern with its main program is the office high-rise building for European Union in Brussels, Belgium along with its supporting facilities.

Problem:

The site has different level of contours which creates a challenging task to connect four streets with different characteristics. It is important to notice also the amount of the square meter programmes required will affect the composition and design strategy in this project. Additionally, there are existing

buildings on the site which by Christian de Portzamparc (the master planner for this area) are proposed to be retained. One of it is considered as a conservation building.

Research question:

Primarily, the issues that I would like to research in this graduation project are the notion of public space at street level where tall building meets with ground as well as in higher level of the tower and the notion of materiality and perception of users in those spaces. Then, by learning from case studies that have been built so far combine with my own experiences working and living in high-rise buildings, I started to pose questions relating the issues of public spaces and natural environment integration in high-rise building (tower) in order to enhance its user's perception and senses. On the lower level, the question to consider is the connection of the towers of this project to the ground with different levels contours and how to extend the public domain beyond the street level. How to connect and place the high-rise tower(s) related to the urban fabric surrounds it where most of the buildings are still low. Thus, on the higher level or in the tower itself, the question is how to integrate public space into floors space design in order to create a better working and living environment for its users while still maintaining its efficiency and functionality. Including, on how the experience and perception of the users in these spaces can be enhanced by the exploration of material, detail and construction techniques.

Another important issue is how to house a vast amount of programme into a design of tall building(s) which also considering its effect of shadow to the area below.

2. Goal of Final Project

My goals for this graduation project are:

- Creating an elegant, compact and functional tall building design.
- Creating a tall building which integrates public spaces in its lower part and higher part (tower) in order to enhance its environment condition, users' experience and perception in the building. Working and living in high-rise building should not make people disintegrate with its natural environment and community. It should not seclude in its own 'height' but its design

should enhance the connection between its users and enhance their experience and perception to be there likewise in the lower level.

- A tall building design which is considering wind, sun and shadow factors in the decision making process.

3. Process (methods, techniques of research and design)

In this graduation project, I combine case studies and literature research to support my design process. My problem statements guide me to the research of several case studies as references, such as Commerzbank tower in Frankfurt for its atrium and natural environment at the tower, Rockefeller Centre and Metropol parasol for its public space, etc but at the same time I also try to learn from the history of tall building itself, its typology, core combination and position in order to know the existing, development and trend of ideas behind tall building. It helps me to propose an alternative tall building design in this graduation project. Then, I visited one of the EU's offices and interviewed the staffs to get the idea of the working environment and culture there. I also reflect on my own experiences to visit several high-rises including working and living on it to help me synthesizes my goals in this project.

For the design process itself, I started with sketches and model studies in 1:1000 scales to get initial ideas of the masses. I tried several alternatives of forms and compositions with several points as benchmarks to keep in the mass variations.

Then, I continued to 3D digital modelling for massing in order to check them more accurately in scale. Afterwards, I will go back to model studies again in different scales (1:500, 1:50, and 1:20) to do more analysis and support the design development.

4. Literature (theory and research data)

In order to support the design process of my graduation project, I have done literature and case studies research. Start from knowing the history and development of high-rise, the important factors in designing it, typology, and public space, sustainable tall building, and so on. I also learned the process and construction of several high-rise buildings from the video and articles, including its demolition which I believed that the knowledge of it will help me in designing a better high-rise project.

List of literature (per 17th Januari 2013):

Books

Appleyard, Donald, Lynch, Kevin, and Myer, John R. *The View from the Road*. Cambridge (Mass): MIT Press, 1965.

Aureli, Pier Vittorio. Brussels – *A Manifesto Towards the Capital of Europe*. Rotterdam: Nai Publishers, 2007.

Avermaete, Tom (ed.). *Architectural Position: On Architecture, Modernity and the Public Sphere*. Amsterdam: Sun Publisher, 2009.

Beedle, Lynn S. (ed.). *Second Century of the Skyscraper*. New York: Van Nostrand Reinhold Company, 1988.

Binder, Georges (ed.). *One Hundred and One of the World's Tallest Buildings*. Victioria: Image Publishing, 2006.

Campi, Mario. *Skyscrappers*. Basel: Birkhauser, 2000.

Eisele, John and Ellen Kloft (eds.). *High-Rise Manual: typology and Design, Construction and Technology*. Basel: Birkhauser, 2002.

F.D van der Hoeven, M.G.J Smit, S.C. van der Spek (eds*.). Street-Level Desires: Discovering The City on Foot*. Delft: Delft University of Technology, 2008.

Firley, Eric and Julie Gimbal. *The Urban Towers Handbook*. West Sussex: Wiley, 2011.

Lepik, A. And Andre Santer. *Metropol Parasol*. Ostfildern: Hatje Cantz, 2011

Meyer, Han and Daan Zandbelt (eds.). *High-rise and the Sustainable City.* Amsterdam: NAi, 2012.

Per, Aurora Fernandez, et al. *This is Hybrid*. Vitoria-Gasteiz: a+t, 2011.

The Task Committee on Urban Aerodynamics. *Urban Aerodynamics: Wind Engineering for Urban Planners and Designers*. Virginia: ASCE, 2011.

Yeang, Ken. *The Skyscraper Bioclamatically Considered*. West Sussex: Wiley, 1996.

Yeang, Ken. *The Green Skyscraper: The Basis for Designing Sustainable Intensive Buildings*. London: Prestel,1999

Yudelson, Jerry*. Green Building Trends: Europe.* London: Island Presss, 2009

Video Online

For Creative Cities, the Sky Has Its Limit

http://online.wsj.com/article/SB10000872396390443477104577551133804551396.html
Heart of Glass 1Bligh Sydney
http://vimeo.com/44632348
How do you demolish a skyscraper?
http://www.bbc.co.uk/news/magazine-20535821
National Geographic Megastructures: Singapores Vegas
http://www.1channel.ch/watch-2717921-National-Geographic-Megastructures-Singapores-Vegas
Razing skyscrapers from the inside: High-rises slowly vanish as new techniques ditch demolition crews
http://www.japantimes.co.jp/text/nn20130108f1.html
Skyscrapers - past, present and future
http://www.bbc.co.uk/news/magazine-20447257
Skyscraper stories: Reaching for the sky
http://www.bbc.co.uk/news/world-20578262

Journal

Philip Oldfield, Dario Trabucco & Antony Wood (2009): *Five Energy Generations of Tall Buildings: An historical analysis of energy consumption in high-rise buildings*, The Journal of Architecture, 14:5, 591-613.

5. Reflection

Based on the researches and analysis that I have been conducted so far and combine with my own personal experiences working and living in tall buildings, I believe that through this graduation project, I can proposed / contribute in the development of a better and ideal condition of living and working environment in tall building. The value of this graduation project lies in its proposal for public spaces, not only on the ground floor but importantly in the tower itself.

In social and community context, the construction of high-rise buildings have impacts on the area surrounding it such as from its wind effect and shadow, therefore it is supposedly encourage that the buildings ‘giving’ something back to its neighbourhood by put more attention on public space for community activities.

From scientific framework, this project proposes an interesting way of thinking and designing tall building where through the combination of several cores location and sky atrium/public space, we can bring the community interaction

and natural environment likewise on the ground floor up to the higher level of towers. But whatever the future appearance the skyscraper may take, it must provide a sense of presence, of belonging and identity. At the same time it must be for people, giving them a feeling of well-being and enjoyment as well as a place to live and be happy.

6. Work and Time Planning

a. P1

- Research on high-rise typology, vertical transportation, structure, etc
- Site survey
- Urban & Site analysis
- Program analysis
- Initial draft of position paper

  Result: high-rise manual, research theme, site analysis, group project of EU high-rise tower

b. P2

- Site and city re-survey
- Research on EU
- Visiting EU's office and interviewing the staffs
- References/case studies analysis
- Finalised position paper
- Concept
- Sun and Wind analysis
- Developing inital diagrams of zoning, circulation, services, etc
- Initial layout plans, sections of the buildings, etc
- Developing model studies (1:1000, 1:500)

c. P3

- Developing final details of the concept
- Developing structural & construction concept
- Analyses of case studies for facade & sustainability
- Developing facade design
- Materialisation
- Developing concept of sustainability, building system and physics
- Developing analysis, design, and model studies for street level connection/public space and sky inner courtyard (1:500/1:200/1:100)

- Developing model studies for facade/skin (1:50, 1:20)
- Developing initial critical details
- Finalised lay-out plans

d. P4
   - Finalised facade's designs
   - Finalised: sustainability, building system and physics
   - Finalised structure and construction system
   - Finalised critical details and construction issues

e. P5
   - All result from P4 presentation will be improved and further developed for public presentation
   - Making the graduation booklet consists of compilation from all the project's process (researches and design)
   - Making the final model of building and facade fragment

TALL GRADUATION 2012-2013 STUDY PLAN

P2 Schedule

No	Task	TIME: November 26 27 28 29 30	December 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	Januari 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
1	Research on EU, context and site			
	Research on case studies, literature, etc			
2	Massing Study			
	Model study: plinth, connection between tower with the ground			
	Model study: tower			
	Finalized: form and concept			
3	First draft:			
	Floor Plan			
	Structure			
	Building Services			
	Section			
	Facade			
	Sustainable			
4	Finalized:			
	Floor Plan			
	Structure			
	Building Services			
	Section			
	Facade			
	Sustainable			
6	Model 1: 500 for presentation			
7	3D perspective			
	Finish all the drawing requirement			
	P2 final presentation power-point			
	Final poster lay-out			
	Print the final presentation			
8	Final presentation			

P3 Schedule

No	Task	TIME: Januari 26 27 28 29 30 31	Februari 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	March 1 2 3 from 4 to 15
1	Development:			
	Model: tower and plinth			
	Model of facade / skin			
2	Development:			
	Floor Plan			
	Structure			
	Building Services			
	Section			
	Facade			
	Sustainable			
3	Develop the concept and design of one particular space / programme			
	(It will be decided later)			
4	Finalised:			
	Floor Plan			
	Section			
5	Materialisation			
6	Development Critical Detail 1:10			
	Development Critical Detail 1: 5			
7	Model 1: 500 for presentation			
	Detail Model			
8	3D perspective			
	Finish all the drawing requirement			
	Draft of the final presentation power point			
	Finish the poster lay-out			
	Print the final presentation			
9	Final presentation			

P3 Presentation

P4 Schedule

No	Task	TIME: March 16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	April 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	May 1	2	3	4	5	6	7	8	9	10	11	12	from 13 to 24
1	Finalised facade's design																																																											
2	Finalised sustainability, building system and physics																																																											
3	Finalised structure																																																											
4	Finalised Critical Detail 1:10																																																										
	Finalised Critical Detail 1:5																																																										
5	Model 1:500 for presentation																																																										
	Detail model																																																											
6	3D perspective																																																										
	Finish all the drawing requirement																																																										
	Final presentation power point																																																										
	Finish the poster lay-out																																																										
	Print final presentation																																																										
7	Final presentation																																																										

P5 Schedule

No	Task	TIME: May 25	26	27	28	29	30	31	June 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	from 17 to 21
1	Improve the presentation																								
2	Improve the drawing's documents																								
3	Making the graduation booklet																								
4	Final model of building (1:500)																								
5	Final model of facade fragment (1:20/1:50)																								
6	Final presentation																								

Deadline for Development
Deadline for Result
Weekend
Presentation Week

Rethinking the Embodied Phenomenology of Perception and Tectonic Culture in Tall Building's Public Space

Patrick Hendy S. Lim

4184351

Supervisors:

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Lara Schrijver

AR3A160 Lecture Series Research Methods

MSc3 - TU Delft

Materialisation - Tall Graduation

2012 - 2013

Rethinking the Embodied Phenomenology of Perception and Tectonic Culture in Tall Building's Public Space

Introduction

In the first place, architect needs a firm basis frame of thought that underlays his research, analysis and creativity as part of design process in architecture. It can become the key characteristic to differentiate his works from others. This position paper tries to define my frame of thought in architecture which relates to my graduation project in Tall Building studio at TU Delft. This graduation project is about designing a complete district of mixed functions and embeds it into the urban pattern with its main program is office high-rise building along with its supporting facilities for European Union in Brussels, Belgium. The challenging problem from this project is that the site has different level of contours which requires special attention from the architect to connect four streets around it with different characteristics. Additionally, there are existing buildings on the site which by Christian de Portzamparc (the master planner for this area) are proposed to be retained. One of it is considered as a conservation building.

Primarily, the issues that I would like to research in this graduation project are the notion of public space at street level where tall building meets with ground as well as in higher level of the tower and the notion of materiality and perception of users in those spaces. Then, by learning from case studies that have been built so far combine with my own experiences working and living in high-rise buildings, I started to pose questions relating the issues of public spaces and natural environment integration in high-rise building (tower) in order to enhance its user's perception and senses. On the lower level, the question to consider is the connection of the towers of this project to the ground with different levels contours and how to extend the public domain beyond the street level. How to connect and place the high-rise tower(s) related to the urban fabric surrounds it where most of the buildings are still low. Thus, on the higher level or in the tower itself, the question is how to integrate public space into floors space design in order to create a better working and living environment for its users while still maintaining its efficiency and functionality. Including, on how the experience and perception of the users in these

spaces can be enhanced by the exploration of material, detail and construction techniques.

Public Space in Tall Building

Tall buildings design is strongly affected by certain issues such as structure, space efficiency, construction method, and type of facade which these are originated from traditional framework of mass production methods after post-world war period. There was a time when it became generic in the appearances and designs which has been highlighted by Louis Sullivan through his remark that the design of skyscraper was merely the translation of structure and plan into appropriate cladding and ornament (Beedle 1988, 4). For tall buildings, architects appear to overemphasis the design of the external appearance compares to their internal architecture. Mostly, tall buildings are built as representation of wealth and symbol of status. I believe that architect must avoid to design tall buildings as monuments which try to represent empty symbolism. Tall buildings should not try to compete to be the tallest and to have the most advance technology, but they should emerge out of the cities of which they are part of it and, in turn, enrich those cities. Indeed, they must be integrated into their urban cityscape with consideration to the horizontal activities at street level and the verticality of the tower.

When carefully configured, the integration of public space in high-rise towers can also activate public life in cities. According to Rogers that “in order to fully appreciate a high density social urbanism, cities must increase the quality and quantity of well-planned public spaces that are human in scale, healthy, safe and lively” (Meyer 2012, 24). On the lower level, this is best done by looking at the character of the adjacent streets on the pedestrian realm. Especially, it is widely known that the streetscape culture has been rooted long time ago and became unique characteristic of European cities. Certainly, most of the modern high-rise buildings have made surrounding streets uncomfortable for pedestrians and public use. Thus, it is our challenge to make the connections that turn a complex of tall buildings into something that possesses genuine urban qualities. As suggested by Meyer that to entice people to walk, city street should have activate building frontages at ground level (Meyer 2012, 25). The streetscape affected by tall building should be made more human in scale and more suitable for outdoor usage instead of becoming open space which is being left unused. The boundaries with the road

and public spaces should be melt into building's landscape. For the reasons above, the view from the road to the building and its public space can be a dramatic play of space and motion, of light and texture, all on a new scale (Appleyard 1965, 3). As a result, here comes the importance of the connection of tall buildings to the ground through its public spaces, likewise with public spaces on the higher level and its sequence while approaching the building to enhance the experience and perception of the viewers through carefully design composition, material, texture, and so on as the research topic of my graduation project.

Materiality and Perception in Public Space

Generally high-rise design demands high efficiency and compactness which providing not enough communal area, neither good working and living environment, nor natural daylight and air flow in its design. Therefore, the integration of public spaces in the tower become important if the building wants to embrace human qualities in order to enhance its users' perception and experience. As I have pointed out above that for the reason of efficiency, structure, and so on, the design of tall building pays less attention to its internal architecture, public space, view and users' experience. Indeed, there is a tendency that tall building becomes a "soulless' large spaces stacking high on top each other to be inhabited by people. We cannot find in tall buildings the same public life characteristics or atmosphere like we found at street level of the cities.

Essentially, architecture is mainly understood as the 'producer' of space to accommodate the physical needs of users, but at the same time it goes beyond that primary fundamental functions. The psychological aspect of 'conscious mind' from the users cannot be detached their body existence in the world since the world or space is perceived by users as they move through it. This experience becomes meaningful and understandable by sensing the 'phenomena' produced by the space itself. The user locates objects and spaces in a total structure, orienting himself with regard to the world around him. In addition, he reads meanings into this world. These user perception, body and senses experiences are mainly investigated by Merleau-Ponty in his book 'The Phenomenology of Perception".

Then, what equally important is the notion of tectonic tradition in architecture where architecture is seen as a constructional craft. There is close relation between this notion with users' perception in space. It becomes interesting to see how both

constructional form and material character were integral to an evolving architectural expression of their work. Likewise, in this notion of thought, Steven Holl highlights that "the material, detail and structure of a building is an absolute condition. Architecture's potential is to deliver authentic meanings in what we see, touch and smell; the tectonic is ultimately central to what we feel...."

With regards to those notions above, working and living in high-rise building should not make people disintegrate with its natural environment and community. It should not seclude in its own 'height' but its design should enhance the connection between its users and enhance their experience and perception to be there likewise in the lower level. The basic sensation of space is confinement and of the dimensions of that confinement. But this sensation may be modified in many ways: by space form or its proportions, by the character of the defining elements or objects in the space, by the position of the observer. One of the strongest visual sensations is a relation of scale between an observer and a large environment, a feeling of adequacy when confronted by a vast space. Therefore, those are the notions that I would like to achieve in my graduation project where the public spaces in tall buildings become the critical decision factors in the design process and result. However, they are not only just 'open and large space'. It goes beyond where the attention to material, detail, and construction technique will determine the success of those public spaces to enhance the perception of their users. In the end, they will become active and meaningful spaces to enrich the building and city.

Conclusion

Thus, from the discussions above, it is indicated that there are close relation between the phenomenological perception of space and the notion of tectonic in architecture which it would be interesting to be researched further how the materiality, the detail and construction form the visual effect like perspective and affecting the space perception of users especially in tall building's public spaces. Through this graduation project, I would like to contribute in the development for a better and ideal condition of living and working environment in tall building. The value of this graduation project lies in its proposal for public spaces, not only on the ground floor but importantly in the tower itself where we can bring the community interaction and natural environment likewise on the ground floor up to the higher level of towers. In social and community context, the construction of high-rise buildings always have

impacts on the area surrounding it such as from its wind effect and shadow, therefore it is supposedly encourage that the buildings 'giving' something back to its neighbourhood by put more attention on public space for community activities. But whatever the future appearance the skyscraper may take, it must provide a sense of presence, of belonging and identity. At the same time it must be for people, giving them a feeling of well-being and enjoyment as well as a place to live and be happy.

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References:

Appleyard, Donald, Lynch, Kevin, and Myer, John R. *The View from the Road*. Cambridge (Mass): MIT Press, 1965.

Avermaete, Tom (ed.). *Architectural Position: On Architecture, Modernity and the Public Sphere*. Amsterdam: Sun Publisher, 2009.

Beedle, Lynn S. (ed.). *Second Century of the Skyscraper*. New York: Van Nostrand Reinhold Company, 1988.

Frampton, Kenneth. *Studies in Tectonic Culture*. Cambridge (Mass): MIT Press, 1995.

Hoeven, F.D van der, M.G.J Smit, S.C. van der Spek (eds.). *Street-Level Desires: Discovering The City on Foot*. Delft: Delft University of Technology, 2008.

Lefebvre, Henri. *The Production of the Space* trans. by Donald Nicholson-Smith. Oxford: Blackwell Publishing, 1991.

Lynch, Kevin. *The Image of the City.* Cambridge (Mass): MIT Press, 1960.

Merleau-Ponty, Maurice. *The Phenomenology of Perception* trans. by Colin Smith. London: Routledge, 2002.

Meyer, Han and Daan Zandbelt (eds.). *High-rise and the Sustainable City*. Amsterdam: Techne Press, 2012.

Graduation Project – Reflection P4 & P5

Student : Patrick Hendy S. Lim
Student Number : 4184351
Graduation Studio : Tall Building Design Vertical Cities Europe
Supervisors : Darrel Ronald, Tanner Merkeley, Arie Bergsma

Aspect 1: The relationship between research and design.

Research is important in my design process especially in this topic of tall building which there are many new aspects and approaches that we have never encountered before. There are many new areas and data that I have not known previously but have significant impact on my design decisions and choice. Also, it helps to guide and rectifies the knowledge I had before in order to achieve better solutions in design. For example, the research on elevator and its zones distribution.

Aspect 2: The relationship between the theme of the studio and the subject/case study chosen by the student within this framework (location/object).

I used some case studies to support my research and design which it did not only limited in office or EU issues but also including public space, hotel, fire safety, high-rise construction and dimantling methods, etc. I learned these through different medium suc as literature, video, internet, movie, etc. I found that during this graduation process, it is helpful for me to get those inputs from different sources as issues to be considered in my design.

Aspect 3: The relationship between the methodical line of approach of the studio and the method chosen by the student in this framework.

The methodical approach of the studio and tutors who have carried it out, in my opinion, has helped improving my working and design method. The regular weekly update compilation, the discussion on graduation booklet and mid-term presentations helped me to review back on my developments and keeping me on track during the long design process.

Aspect 4: The relationship between the project and the wider social context.

In designing large and tall buildings, we have to look more on its impact in the city's skyline whether it becomes harmonious with surrounding buildings or

becomes an object of disruption especially in the lower part of the buildings. Another important aspect are the question on how the design of the new building can reduce the impact of its large people movements and activities to its surrounding neighbourhood. Also, how to integrate and even to heighten the quality of the area. Thus, I believe that when we design a large and tall building, it is supposedly encourage that the building is ‘giving’ something back to its neighbourhood by put more attention on public space for community activities and not acts alone in its tallness. In my design process and result, I have tried to incorporate and achieve these in the creation of lower part and atrium of my buildings. Including the arrangement of people movement of each programmes relating to the main functions (office and meeting) with public/community functions.