

Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences

Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners (Examenscommissie-BK@tudelft.nl), Mentors and Delegate of the Board of Examiners one week before P2 at the latest.

The graduation plan consists of at least the following data/segments:

Personal information	
Name	Rosanna Al-Mahaqeri
Student number	6068812

Studio	
Name / Theme	Explore Lab
Main mentor	Roel van de Pas
Second mentor	Rufus van den Ban
Third mentor	Aart Oxenaar
Argumentation of choice of the studio	I am very interested in humanitarian architecture and how design can be used in fostering more meaningful spaces. Considering my interest in post-conflict recovery in the Middle East, the Explore Lab studio provides me with the perfect opportunity to explore a project within a humanitarian setting.

Graduation project	
Title of the graduation project	Post-conflict recovery of a school in Sana'a
Goal	
Location:	Sana'a, Yemen
The posed problem,	Post conflict recovery and early reconstruction of a school in Sana'a
research questions and	How can vernacular elements be integrated with modern construction techniques to design a culturally rooted and sustainable school in post-conflict Sana'a, Yemen?
design assignment in which these result.	Designing a primary + secondary school, in which the design focuses on locally available materials, culturally appropriate design principles, and participatory design approaches.
The research will focus on whether vernacular elements can be integrated with modern construction techniques in the post-conflict reconstruction of Sana'a. It will provide a wide overview on vernacular architecture, resilience, post-conflict urban recovery, and the importance of architectural identity in the built environment. The	

paper will conclude by providing a list of design guidelines on the appropriate vernacular elements to use in the current reconstruction of Sana'a.

The design project will be based on the design of culturally appropriate school in a neighbourhood on the outskirts of Sana'a. The design of the school will be based on the outcomes of some architectural studies (context, materiality, references, etc.) and the design guidelines gathered in the research paper.

The school should be culturally appropriate, sustainable, designed with available (or local) materials, and enhance community engagement.

Process

Method description

The Research Paper:

- The research paper will start with the contextual background and theoretical framework which is developed through research in vernacular architecture in Yemen, resilience, post-conflict urban recovery, and the importance of architecture identity on the built environment.
- The second part of the research paper will focus on a comparative case study analysis. The first case study analysis will explore the traditional architectural elements in Sana'a, while the second case study analysis examines the precedent post-conflict reconstruction plans of Aleppo and Beirut.
- The outcome will be a list of design guidelines and approaches that informs the reconstruction process of Sana'a. The goal is for these design guidelines – a list of vernacular design elements – to be used within the design project to create more culturally appropriate and sustainable designs choices.

The Design Project:

- In order to start the design project, the following architectural studies will be examined:
 - o Materiality study: looking at the locally available material. Shifting from concrete construction (current building standard) to a wood, stone or/and mud construction.
 - o Volumetric study: building heights (traditionally and currently), building height for this specific school building.
 - o Context analysis: general analysis, greenery + water structures, available functions, etc.
 - o Systems to include within the design: passive house? Water collection? Waste management? Self-sustaining compound?
 - o Program study: creating the design brief. What is the required program for both a primary and secondary school? What type of green or recreational space is needed? How could this program also reach the general community?
 - o Reference project analysis: schools within the same climate context, designs with similar materiality goals, schools with similar briefs.
- Based on the studies above and the research paper, a design for a culturally sensitive and sustainable school in Sana'a will be proposed.

Literature and general practical references

Literature sources:

Abdallah, Mohamed reda, Hassan Ahmed Hassan, and Ali Abbas al-Olofi. "Traditional Yemeni Architecture and Its Impact on Energy Efficiency." *International Journal of Engineering Research and Technology* Vol 13, no. 8 (2020). <https://doi.org/10.37624/ijert/13.8.2020.2014-2022>.

Al-Harithy, Howayda, Dina Mneimneh. "Integrating culture, recovery and reconstruction for sustainable urban development: Beirut case study." *UNESCO Publications*, 2022. <https://whc.unesco.org/document/175507>.

Al-Sabahi, Hatim M. "A Comparative Analysis of the Vernacular Housing Cluster of Yemen: Sana'a and Shibam Hadhramawt A Case Study." *Journal of Science & Technology* Vol. 10, no. 2 (2005): 27–34. <https://doi.org/10.20428/jst.v10i2.71>.

Al-Sallal, Khaled A. "Vernacular Tower Architecture of Sana'a: Theory and Method for Deriving Sustainable Design Guidelines." In *Sustainability, Energy and Architecture*, edited by Ali Sayigh, 257–287. Oxford: Academic Press, 2013. <https://doi.org/10.1016/B978-0-12-397269-9.00010-4>.

Bagasi, Abdullah Abdulhameed, John Kaiser S. Calautit, Abdullah Saeed Karban. "Evaluation of the Integration of the Traditional Architectural Element Mashrabiya into the Ventilation Strategy for Buildings in Hot Climates." *Energies* Vol 14, no. 3: 530(2021): 1-24. <https://doi.org/10.3390/en14030530>.

Benslimane, Nawal, Ratiba Wided Biara. "The urban sustainable structure of the vernacular city and its modern transformation: A case study of the popular architecture in the Sahelian Region" *Technologies and Materials for Renewable Energy* (2018): 1241-1252. <https://doi.org/10.1016/j.egypro.2018.11.290>.

Heath-Kelly, Charlotte. *Death and security: Memory and mortality at the Bombsite*. Manchester: Manchester University Press, 2017.

Inalhan, Goksenin, Eunhwa Yang, and Clara Weber. "Place Attachment Theory." In *A Handbook of Theories on Designing Alignment between People and the Office Environment*, edited by Rianne Appel-Meulenbroek and Vitalija Danivska, 181–194. London: Routledge, 2021.

Lahoud, Adrian, Charles Rice, and Anthony Burke. *Post-traumatic urbanism*. 5th ed. Vol. 80. Hoboken, N.J: Wiley, 2010.

Miznazi, Diana. *Reconstruction of Cultural Heritage in Aleppo, Syria Reviewed: a critical*

exploration of current endeavors and practices. CEU School of Public Policy, 2023.
www.thealeppoproject.com/wp-content/uploads/2023/01/MiznaziPaperWithCoverV01.pdf.

“Reconstruction and Recovery in Yemen: Recommendations from the Development Champions.” *Rethinking Yemen’s Economy*, April 8, 2019.
https://devchampions.org/publications/policy-brief/Reconstruction_and_Recovery_in_Yemen/.

Risk, Yara. “Beirut Post-War Reconstruction: The Case of the Grand Theater.” *Beirut Post-War Reconstruction: The Case of the Grand Theater*, 2019.

Sayigh, Ali, and ed. *Sustainable Vernacular Architecture: How the Past Can Enrich the Future*. Cham, Switzerland: Springer Nature, 2019. <https://doi.org/10.1007/978-3-030-06185-2>.

SOUFAN, Anas. “Historiographical Overview on the Post Conflict Reconstruction in Syria: From the Mid-19th Century to the 2011 Crisis.” *UNESCO Publications*, 2015.

Tamimi, Azzam Khalid S.A, Dr. Halil Zafer Alibaba. “Integration of the Vernacular Passive Cooling Systems with Contemporary Architecture in the Middle East.” *International Journal of Recent Research in Civil and Mechanical Engineering* Vol. 3, no. 2 (2017): 8-16.
www.paperpublications.org/upload/book/Integration%20of%20the%20Vernacular-859.pdf

Thiel, Fabian, Rahaf Orabi. *Reviving Aleppo: Urban, Legal and Digital Approaches for Post-War Recovery*. London: Springer Nature, 2024. <https://doi.org/10.1007/978-3-031-65858-7>.

Vale, Lawrence J., Thomas J. Campanella. *The Resilient City: How Modern Cities Recover from Disaster*. New York: Oxford University Press, 2005.

Reference projects for the design project:

González, María Francisca. “Bio-Climatic Preschool / BC Architects.” ArchDaily, July 1, 2018.
https://www.archdaily.com/896832/bio-climatic-preschool-bc-architects?ad_source=search&ad_medium=projects_tab.

Abdel, Hana. “Abey Public School / Almimariya.” ArchDaily, May 18, 2024.
https://www.archdaily.com/1016756/abey-public-school-almimariya?ad_source=search&ad_medium=projects_tab.

Abdel, Hana. “International Community School of Baghdad / Studio Muduni.” ArchDaily, January 27, 2024. https://www.archdaily.com/1012517/international-community-school-of-baghdad-studio-muduni?ad_source=search&ad_medium=projects_tab.

Abdel, Hana. “Jacques Majorelle School in Benguerir / Zarchitecture Studio.” ArchDaily,

December 30, 2024. https://www.archdaily.com/1025105/jacques-majorelle-school-in-benguerir-zarchitecture-studio?ad_source=search&ad_medium=projects_tab.

Personal experience/knowledge:

- The Yemeni school system consists of the following grades: primary is 1st-9th grade (ages between 6-15 years) and secondary is 10th-12th grade (ages between 16-19 years).
- The people within Sana'a want to modernise and improve their living situation. The current building market focuses on concrete construction, which they consider to be the modern construction method. However, I would like to explore designing with wood and locally (traditional) available material, such as mud and stone.
- Traditional design elements, like window types and positions, decorative stained-glass windows, and passive cooling systems can be used to provide a more culturally rooted and naturally sustainable design.

Reflection

1. What is the relation between your graduation (project) topic, the studio topic (if applicable), your master track (A,U,BT,LA,MBE), and your master programme (MSc AUBS)?

My graduation project aims to restore Sana'a cultural identity while addressing the neighbourhoods' educational needs in a sustainable manner. The Explore Lab studio provides me with the opportunity to peruse this unique topic, which falls outside of any other studio themes offered in the graduation trajectory. It supports my goal of merging cultural heritage with innovation. The project also relates to the core themes within the Architecture Master's program, such as research-driven design and contextual awareness, by addressing real-world challenges through architecture.

2. What is the relevance of your graduation work in the larger social, professional and scientific framework.

My graduation project contributes socially by exploring post-conflict recovery and reconstruction in Yemen through culturally rooted and community focused design. Professionally, it offers a model for integrating vernacular elements with modern techniques in reconstruction. It is also a stepping stone into what I would like to focus on in the future – post conflict recovery and reconstruction. Lastly, it expands research on sustainability and context-sensitive rebuilding in conflict-affected regions.