



## The College of Graduate Studies and the College of Engineering Cordially Invite You to a

### Master Thesis Defense

#### Entitled

*THE COST OF CONNECTIVITY. ASSESSING THE IMPACT OF SUPERBLOCK ROAD DESIGN  
COSTS ON THE DISTANCE, DIRECTNESS, AND DIVERSITY OF PEDESTRIAN ROUTES.*

#### By

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#### Abstract

Superblocks have been massively constructed and cover a remarkable amount of Abu Dhabi's urban landscape. Recent research has shown that Abu Dhabi's superblocks promote car dependency, which dominates approximately all local transportation, and results in increases of the fossil fuel consumption, increases in greenhouse gas emissions, and negative impacts on air quality. This thesis along with multiple recent studies addressed this issue, looking at the different designs of internal road network of residential superblocks in order to better understand their connectivity. The evaluation of different network designs used in the city's superblocks has provided valuable insights by which to support and better plan for non-motorized mobility. However, a question that remains, is related to how different street networks designs can be evaluated and eventually selected by planning officials when new neighborhoods need to be built. This thesis brings forward considerations regarding investment and connectivity. Its objective is to analyze variations in street investment and connectivity of different superblock street network designs. This evaluation was performed using a sample of ten different superblock designs, typical examples of the designs used in planning Abu Dhabi's neighborhoods. These designs are studied based on road investment that was measured in terms of the ratio of the total street length of each superblock to the number of plots in each superblock. The study of connectivity was measured in terms of distance, directness, and diversity of routes connecting origins and destinations inside each superblock the findings show few similarities across the studied designs, with travel distance as the only measure that shows a certain level of consistency across the sample. Route directness, route diversity, and road investment values were found to vary quite substantially. Most importantly the study found that variations in road investment do not proportionally affect street connectivity. In view of this, simple modifications to the road networks were tested, and highlight the value of retrofitting the superblocks street networks using pedestrian paths. The analysis revealed that these additions to the street network, which affect the total length of the street system, can increase the directness and diversity of the routes inside the superblocks, while keeping road investment values under control. These positive impacts allow retrofitting opportunities for superblocks in Abu Dhabi. The thesis concludes with a discussion about how these findings can develop into a method by which to enhance the selection criteria for superblock design in Abu Dhabi based on road investment and connectivity performance.

**Keywords:** Superblocks, Street Network, Road investment, Street Connectivity, UAE, GCC