ACADIA 2022

A data-driven approach for urban design and master planning development

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Part 3

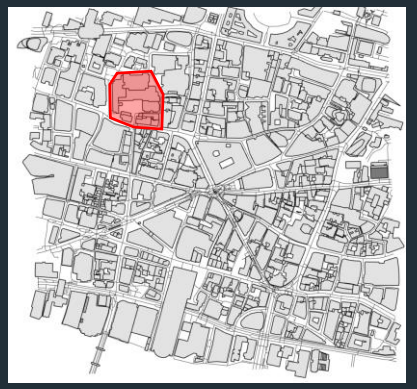
Project Implementation

Acc. Index Amenities

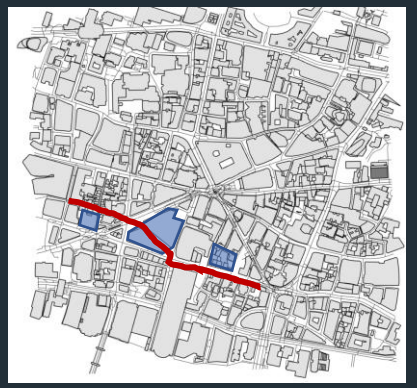
Acc. Index Public Transport

Acc. Index Green Spaces

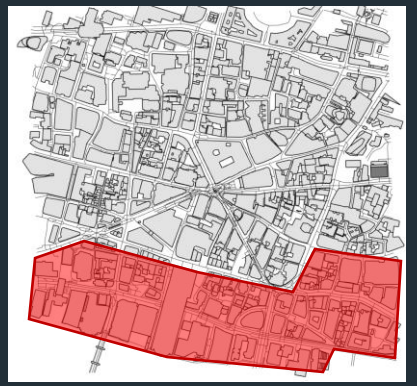
Bet. Workplace - Amenities



Opt_1: Block Development



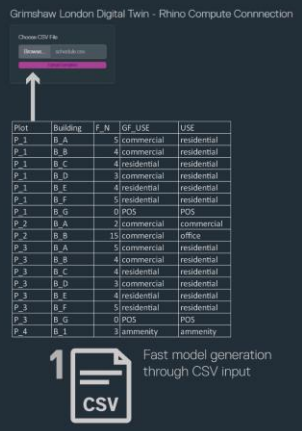
Opt_2: Axis re-development



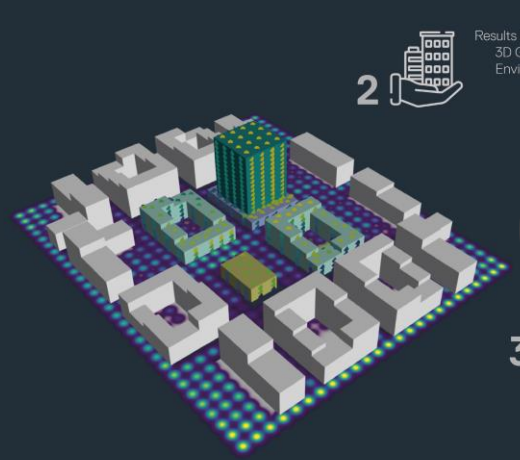
Opt_3: Area regeneration

Opt_1: Block Development (Example)

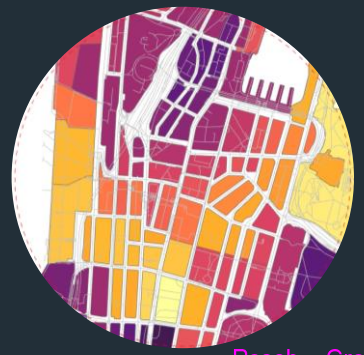
Residential: xxx sqm
Office: xxx sqm
Retail: xxx sqm
Hotel: xxx sqm
Green: plot %



Plot	Building	F_N	GF_USE	USE
P_1	B_A	5	commercial	residential
P_1	B_B	4	commercial	residential
P_1	B_C	4	residential	residential
P_1	B_D	3	commercial	residential
P_1	B_E	4	residential	residential
P_1	B_F	5	residential	residential
P_1	B_G	0	POS	POS
P_2	B_A	2	commercial	commercial
P_2	B_B	15	commercial	office
P_3	B_A	5	commercial	residential
P_3	B_B	4	commercial	residential
P_3	B_C	4	residential	residential
P_3	B_D	3	commercial	residential
P_3	B_E	4	residential	residential
P_3	B_F	5	residential	residential
P_3	B_G	0	POS	POS
P_4	B_1	3	ammenity	ammenity



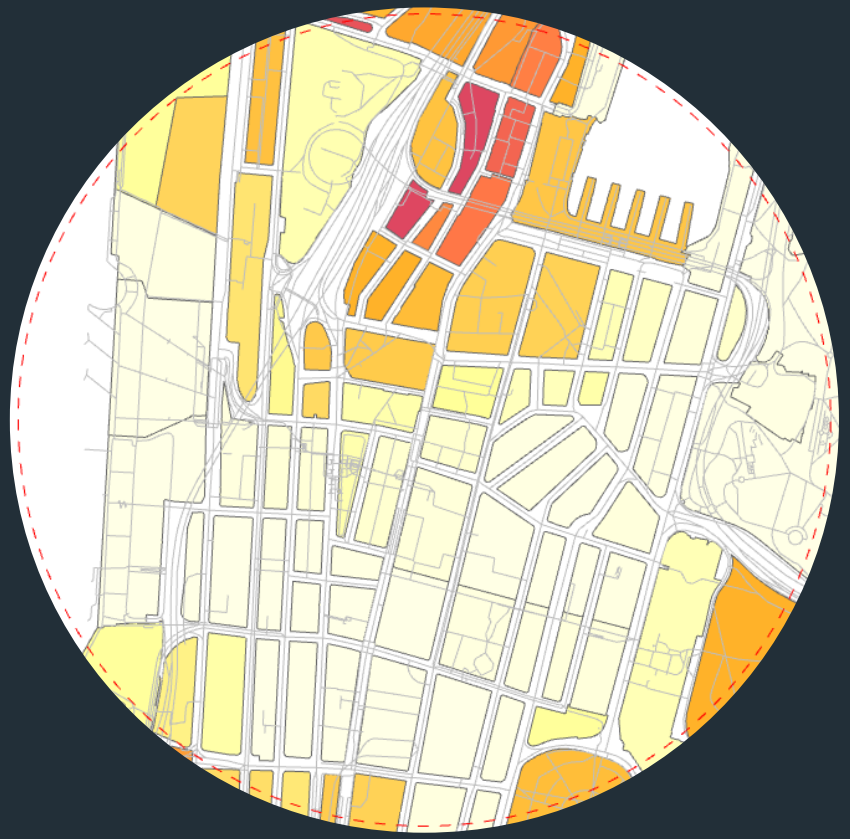
Spatial Analysis – all accessibility measures are calculated based on a catchment radius of 960 m (10 min walking distance), the number of reachable Points of interest, the Straightness of the route and the application of a gravity function in order to evaluate each POI based on the travel effort.



Reach – Green Spaces

Gravity – Green Spaces

Straightness – Green Spaces



Accessibility Index – Green Spaces

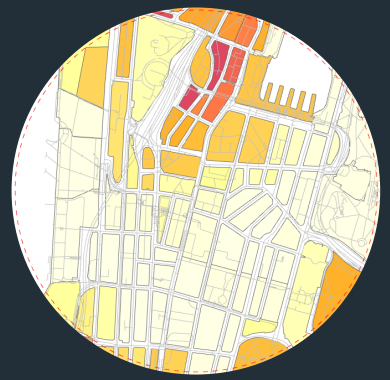
Accessibility Indexes

The **Reach** index, also known as a "cumulative opportunities accessibility index" (Bhat2000; Sevtsuk2010; Jaber and Papaioannou2017) captures how many surrounding destinations(e.g buildings, businesses, jobs, bus stops etc.) can be reached from each Origin within a given Search Radius on the network.

The **gravity** index assumes that accessibility at Origin "i" is proportional to the attractiveness (weight) of Destinations "j", and inversely proportional to the distance or travel cost between "i" and "j".

The **Straightness** index (Vragovic, Louis, et al.2005) illustrates the extent to which the shortest paths from Origins to Destinations resemble straight lines. Put alternatively, the Straightness metric captures the positive deviations in travel distances that result from the geometric constraints of the network in comparison to straight-line distances in a featureless plan.

Spatial Analysis – all accessibility measures are calculated based on a catchment radius of 960 m (10 min walking distance), the number of reachable Points of interest, the Straightness of the route and the application of a gravity function in order to evaluate each POI based on the travel effort.



Access. Index – Green Spaces

Access. Index – Blue Spaces

Access. Index – Fitness

Access. Index – Supermarkets & Grocery Stores

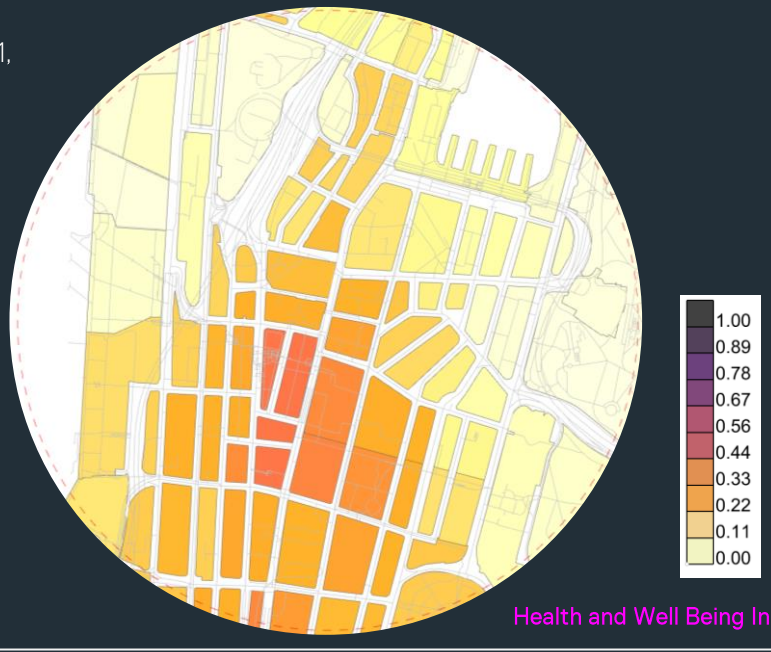
Access. Index – Food Environment

Access. Index – Public Transport

Health and well-being levels are calculated following the methodology by Nimish Biloria et al 2021, in the paper Development of an urban health and wellbeing index for work precincts: A comparative study in Sydney, Australia:

[...An intensive review of these documents led to the identification of potential positive health influences (such as the promotion of physical activities, stress restoration, and the promotion of healthy food habits) resulting from built environment interventions. The following parameters were successively selected as influential factors to support an active lifestyle:

- Public transport accessibility
- Green space
- Blue space
- Food environments
- Fitness facilities
- Supermarkets and grocery stores ...]



Health and Well Being Index

Central location: High Connectivity and accessibility values.

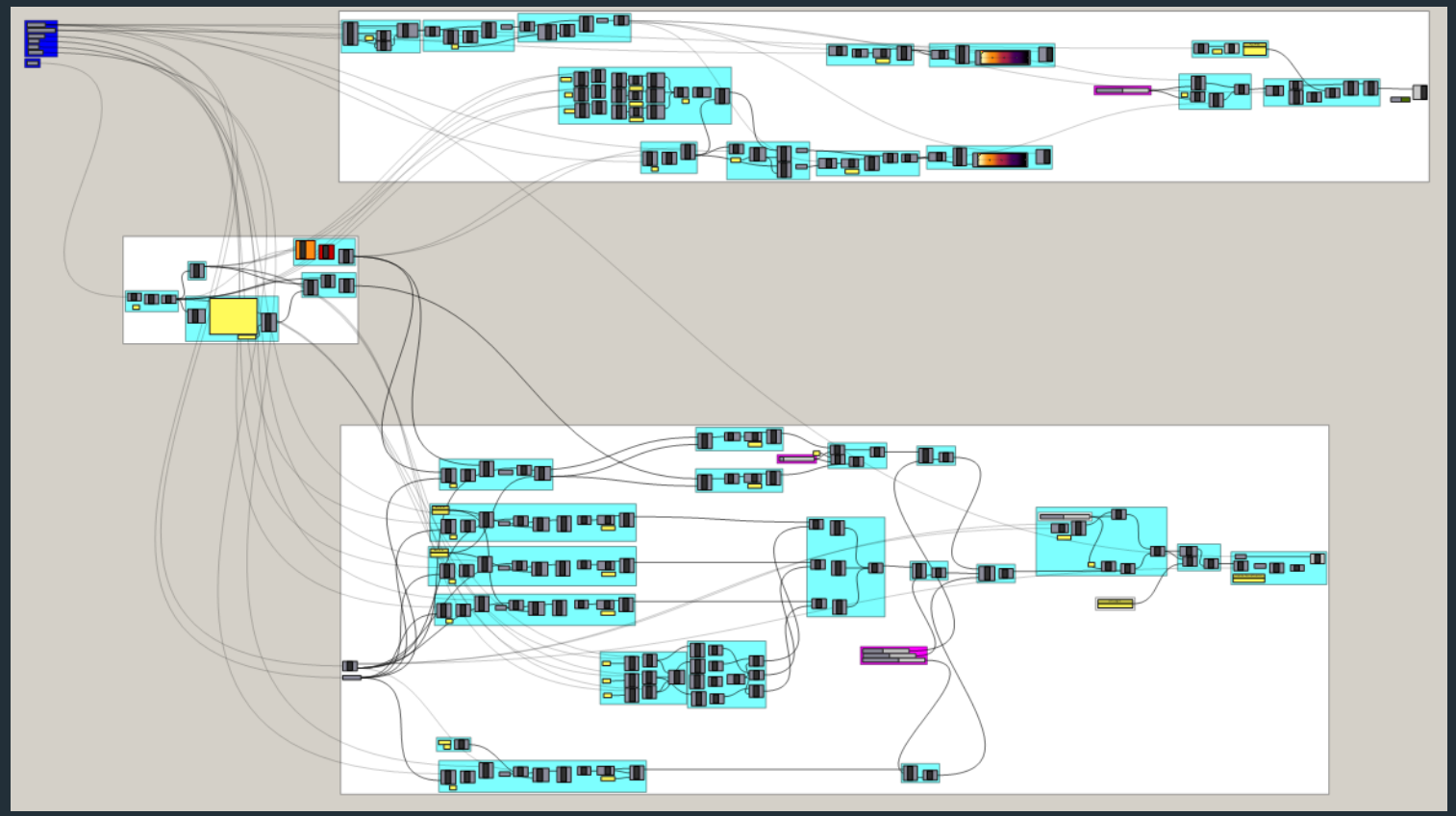
Close to transport nodes.

Close to their priority objectives: e.g., business hotels close to business areas.

Shopping: considered as a secondary objective.

Close to complementary uses: e.g., business hotels in the city centre choose to locate themselves close to buildings like “WeWork” so they can maximize their room area.

Research suggests time expended by hotel guests in the hotel area (1km) is up to 80%

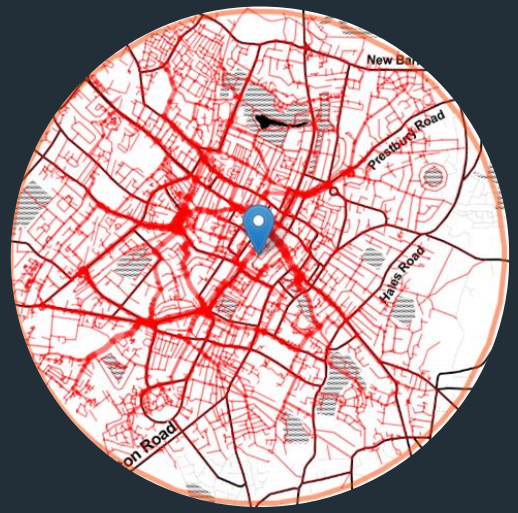


Part-3_ACADIA_Project Example.3dm
Part-3_ACADIA_Project Example.gh

Generate a strategy about different parameters to allocate different land uses, based on the available data

Use grasshopper in order to implement the strategy based on available data

Extract new data from the proposed development (e.g., number of residents)



Evaluate the proposed inner plot paths and obtain a betweenness analysis using a Detour ratio of 1.25