2. LITERATURE REVIEW

In the literature review is all the theories used in the project below:

2.1 *Environment Theory*

2.1.1 Human Scale in Urban Context Theory

In Urbanism, a concept of place is related to four basic senses to perceive the environment. Sight, Hearing, Smell, and Touch. Directly designing cities and building environments at relatively human physical proportions and the approach is to prioritize the pedestrian experience and create environments where people can see, hear, and interact. At a human scale the buildings usually go up to five stories high. The streets should be small enough to allow eye contact and conversations without being too big and distracting. The public spaces are supposed to be designed as enclosed and intimate rather than impersonal (Özyavuz & Özcan, 2022).

Figure 2.1 Bremen schnoor Source: Google maps

The applications of a human-scale design transforms from a scary environment to a safer and calm area. Streets become more of an outdoor place for humans than traffic. An open space area can be used for shops, cafes, and residential entrances. Building facades includes texture and detail maintaining the variation at eye-level as a pedestrian, while plazas are encouraged to linger instead of passing through. The method is prioritizing walking, cycling, and human scale public spaces creating a livable urban environment. This approach has proven in northern European cities like, Bremen, Germany and in Ghent, Belgium.

Figure 2.2 Ghent plaza Source: Google maps

2.1.2 Urban Morphological Theory

Based off the development of medieval European cities, there are clear morphological patterns that layered into the modernization of Bremen and Ghent in the figures above. The cities often represent how medieval street networks is usually irregular and responding to topography. In Bremen its morphological persistence revolves around its Marketplatz and Schnoor. The Schnoor area is packed with houses in narrow streets features of its old medieval design before any transportation was invented (Ahmadi et al., 2009).

Figure 2.3 Bremen schnoor Source: Google maps

The past lifestyle, economic and social structures inscribed its urban shape into a contemporary form of modern European cities. Tight narrow streets and unique facade patterns now stays with the cities new industrial and reconstructed morphologies that coexists with each other. After World-War II the reconstructions of the old morphological patterns is preserved for its urban legibility and medieval character contrasting other cities that prefers modern living blocks over historical preservation. Therefor today the structures of Ghent and Bremen still accommodate new purposes and buildings required for today uses while proving that morphological acknowledgement will sustain cities historical shape and form of its very distinctive urban character.

2.2 *City layout*

2.2.1 Arterial Road hierarchy theory

Arterial road hierarchy theory is about a road principle of transportation planning a traffic engineering that organizes urban street networks into a functional classification system that mimics the human arterial system. From the top to the bottom, the roads come from a large artery carrying large capacity of traffic across distances then slowly narrowing down into centers, districts and regional areas. Below the arterial the roads connect into collector roads; it functions as the local street traffic that sums up to about two lanes or four per street. Balancing the traffic

with lower speeds and neighborhood access, it usually contains homes and property with narrowing roads (Levinson & Zhu, 2012).

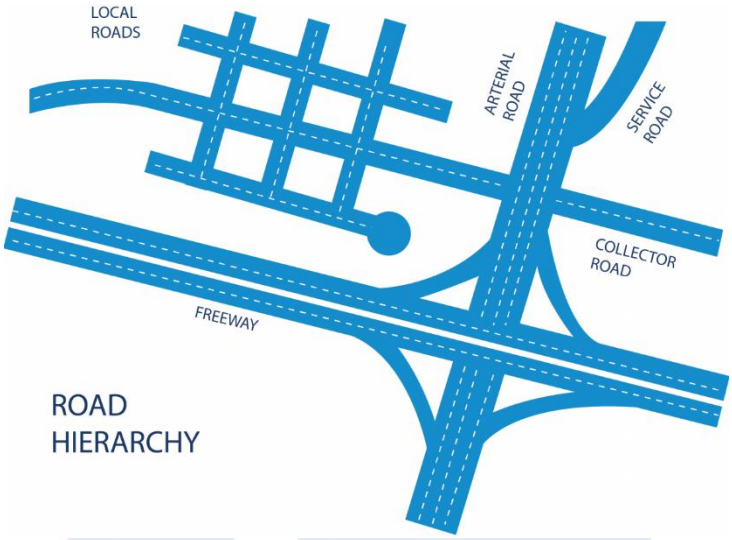

Figure 2.4 Road hierarchy Source: https://www.cnu.org/our-projects/street-networks/street-networks-101

The practical implementation of arterial hierarchy theory shapes the quality of life in urban areas. It naturally manages the traffic, creating calm and safe spaces for the property access and neighborhoods. This theory could conflict with the theories of a walkable or human scaled urbanism. High speed areas can barrier between neighborhoods and small hostile pedestrian environments. But some cities have been carefully managing the same design post-war. By planning carefully on functional neighborhoods and allowing areas to be less car dependent, while doing so the traffic can be balanced out by more pedestrian, cyclists, and public transport. Therefor accommodating both design of a livable neighborhood with a car-oriented transport for further travel (Tsigdinos et al., 2020).

2.2.2 Strip Development theory

Is about a linear commercial development pattern that emerges along major arterial roads. Usually, it appears in car-oriented environments where business can maximize its visibility for the traffic. Where car dependency dominates in a city often the buildings are shallow commercial lots are in front of the arterial roads with parking between the building and the street. The theory explains the strip development as a reasonable market response when cars are dominantly used to compete for attention by parking, direct driveway, and large signs. It's all designed for the quick access and leave than pedestrian accommodation (Lindarto & Harisdani, 2020).

There are consequences of strip development that doesn't stop from aesthetics but also functionality. A higher consequence on pedestrian safety, less trees for sustainability. For the traffic the strip development cuts through multiple safety traffic laws and increases accident rates because of cars entering and leaving the businesses near the arterial road. With cars as a dominant way to travel the pedestrian living starts to be neglected, resulting a less walkable city and inducing more cars leading to enormous amounts of land for parking and garage buildings.

2.3 *Isometric design*

An Isometric projection is visually representing all of is three axes, length, width, and height are equal with the same scale. Isometric view is one of the types of axonometric angles and is a part of the orthographic projection. The lines of the cube axes create a unique axonometric view where the parallel lines are in 3D remains in 2D drawing. The term isometric means equal measure, reflecting the measurement of the axes at 120^{o} angles of each other. The projection becomes popular in technical and engineering because it allows precise showcase of dimensional form (Lockhart et al., 2018).

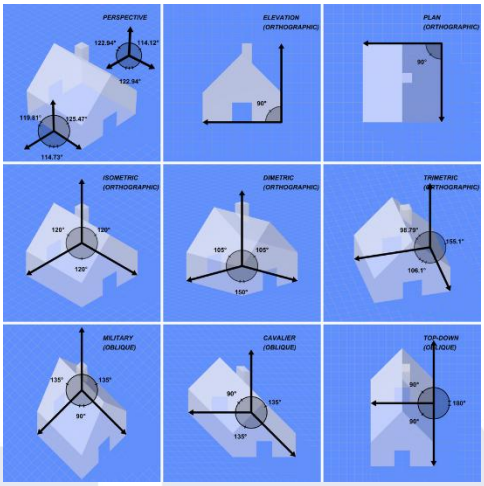

Figure 2.5 Differences of Orthographic projection Source: https://en.wikipedia.org/wiki/File:Graphical_projection_comparison.png

The Isometric projection has been widespread around games and digital media beyond technical drawing. It became a visual art style in animations, videogames, architectural diagrams, and infographics. The styles geometric simplicity means it is easier to render in digital media despite sacrificing depth in perspective it gains its clarity and consistency. A practical advantage of preserving dimensional relationship throughout the moving image.

2.4 *3D modeling*

Polygonal modeling is one of the foundational approaches of creating meshes in a 3D application from a flat 2D polygons. In a digital geometry there are three defining points of polygonal modeling, vertices, edges, and faces. Mainly using extrusion to create polygonal meshes, into cuboids and the numbers affect both visual quality and computational performance that would perfectly fit into real time applications like games or 3D animations to render. A modern polygonal modeling can incorporate subdivisions as adding loop cuts to create certain shapes while maintaining the cuboid flow of the models keeping it simple yet effective. The versatility of the polygonal modeling is direct and simple, manipulating the just the primitive faces allow for cleaner modeling for 3D works and now an industry standard for creative architectural visualizations and virtual cities (Mosiyuk, 2023).