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Comparing and Contrasting 'Real and Virtual' Cities

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Abstract

The rise of the digital age has made the merging of video games with other media a common occurrence. The field of architecture is also subject to this collaboration. Architecture is now a prominent component of video game production, with increasingly elaborate games requiring more immersive virtual environments. Identical recreations of real-life buildings, cities and natural environments are increasing within video games. However, designing buildings for a virtual space is fundamentally different to making architecture for real-life use. This is due to how differently real-life and virtual environments are perceived. Human beings experience the real world with their eyes, while gamers experience the virtual world through in-game cameras. Both tools of visual perception come with different fields of vision. Add to that the boundless nature of a virtual environment and the playability element of a video game. These factors indicate that making architecture within video games must have different design nuances compared to their real-life counterparts. The gap in knowledge lies in the potential for said nuances to be applicable for designing real-life cities. The design of cities for critically successful open-world video games are often acknowledged as vibrant, engaging, interactive and visually pleasing. All the qualities we hope to see reflected in our real cities. In the pursuit of this, questions will be asked about in-game design methods that are insulated from our conservative understanding of architecture and scale. Can said methods then be applied to benefit real-life cities and urban environments? Can video games be a medium for teaching architecture student alternative approaches to designing better cities? The research seeks to discover novel ways to design the built environment, sourced from within video games. But to achieve this aim, understanding the physical elements that make an impactful city image must take precedence. A comparative study needs to be done between 'real' and virtual cities. This leads to the research objective, which is to identify physical attributes that determine a city's design quality. The city determinants will then be observed across both research samples. The comparing and contrasting of physical elements between the two will potentially reveal patterns crucial to forwarding the study. The findings reveal design approaches endemic to video games, that can also be applicable towards real-life urban developments.

1.0 INTRODUCTION

Over the last five decades, development practices have made modern-day cities inhumanely scaled. Modernism and motorist movements have compounded the issue by gradually normalising impersonal designs for cost and density efficiency (Alonso, R., 2017). Jan Gehl the Danish urbanist, once stated that massive, fast-paced, vertical modern cities are a testament to the fact that for the last 50 years, architects have forgotten what it means to have good human scale in design. Modern developers only prioritize addressing inflated land prices, housing shortages and the increasingly dense population. The results are hyper dense cities packed with high-rise accommodations, completely ignoring the size and visual perception of its inhabitants. Out of scale and out of place, the only architectural concern is the construction quickness that soulless modular blocks can provide. It becomes a situation where massive buildings are ironically made for small people, trivializing the concept of human scale altogether (Gehl, J., 2010). This research agrees with Jan Gehl's bold criticism of the construction industry's status quo.

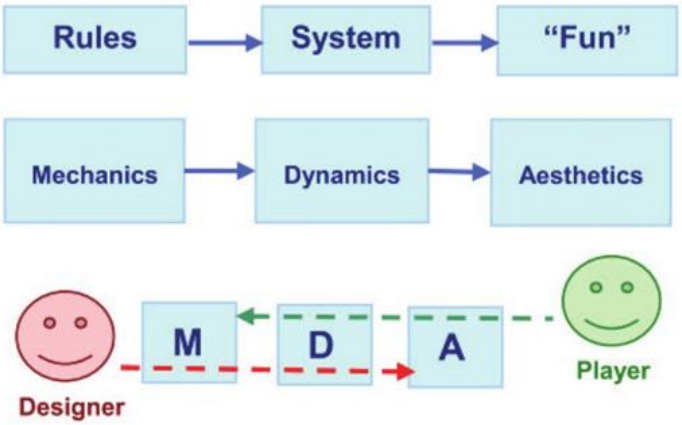


Figure 1. Source: "MDA : A Formal Approach to Game Design and Game Research. Work Challenges Game."

Responding to the aforementioned criticism of modern-day city developments, the video game build-environment is selected as the field of study for potential alternative design solutions. This is because video games have a unique balance between relatability and novelty when it comes to designing built forms. The virtual space is still a three-dimensional space, same as real-life. Virtual space constructs are designed with human visual perception in mind too. There are identical recreations of architecture from real-life within video games. Boosted further by the video game industries pursuit of immersion and realism. Despite all the comparable qualities mentioned, a video game is foundationally designed with sensibilities alien to the ones used to shape cities in reality. This can be attributed to the MDA Framework (Figure 1). Designing video games can be a robust affair. The MDA Framework is an analysing tool meant to quantify and define design factors that would make or break a video game. The MDA Framework is acknowledged by the video game industry as the most widely accepted form of virtual design guidance (Junior, R., & Silva, F, 2021). This presents an interesting scenario, especially for immersive video games featuring real-life architectural recreation. How do level designers recreate real-life architecture faithfully, while using different design guides?

The MDA Framework stands for mechanic, dynamic and aesthetic. These are the three elements that provide context for level designers to calibrate or analyse video games. A helpful tool as it is challenging to focus on design direction, while planning in a blank virtual space devoid of context. The 'mechanics' in the MDA refers to the tools a level designer uses to create interactions between player and platform. These mechanisms are designed for the user to utilize, in order to influence the 'dynamics' and 'aesthetics' part of the framework. 'Dynamics' is the nexus between level designer and gamer. Dynamics is how the mechanics are interacted with, in order to illicit an emotion. A clear mechanic will often result in a clear dynamic between the virtual environment and player. 'Aesthetics' is how the results of said dynamic are measured. Aesthetics are conjured when the player interacts with a gaming system. A positive dynamic is the player exhibiting a desirable emotional response from engaging in the virtual world. The aesthetics part of the framework is

quantifying 'fun' essentially (Junior, R., & Silva, F, 2021). This results in an ironic scenario where a real and flawed modern city like New York has a virtual twin built with the concept of fun instead.

The initiative to include video games as a means to teach architecture is not farfetched. Take the Trabajo Fin De Grado (TFG) for example, an undergraduate thesis program that was introduced to Spanish architecture schools nationwide in 2010. This initiative encourages students to conduct research and academic experiments on subjects that have nothing to do with conventional architecture. (García, M. S., De Lacour Jiménez, R., & Linares, A. M. G., 2020) The subject matter can encompass anything from filmmaking to dancing or even fashion. The Granada University School of Architecture took full advantage of the program and proposed a research experiment related to game studies in architectural education. Students were tasked with analysing buildings in video games with the same scrutiny one would have towards actual built structures, in hopes of learning new ways to express architectural designs. This movement is a key motivating factor for research. To scrutinize the elements of virtual worlds with an assessment framework typically used for real cities.

The study ultimately aims to provide future architecture students with novel ways to design better cities. The application of video game design sensibilities for real city developments, however, must only come after the physical attributes that make cities are understood. The elements that make cities successfully evocative remains the research priority. Other equations linking real-life and virtual built environments will still be scrutinized and used as supporting data. How will shedding light on these speculative means of design affect architectural status quo? Will dialogue on decades-old, unchallenged notions of the human scale be opened up? Will juxtaposing virtual and real-life design practices unearth new ordering devices for better-scaled cities? These questions will be used to discuss the successful identification of the city determinants. Additionally, adding video game inspired design sensibilities into architectural pedagogy could produce trans-disciplinary architecture graduates. A generation of hybrid architects prepared to capitalise on the booming video game industry. A line of graduates well adapted towards a future where virtual spaces will have as much stock as literal ones. The role of academic institutions in guiding this revolution cannot be understated. (A. P. & C. B., 2024). The research intends to prepare Malaysia's academia for the inevitable amalgamation of video games and architecture as a legitimate learning program.

2.0 LITERATURE REVIEW

A publication titled Convergence Between Architecture and Video Games provide insights into how the two worlds are connected. The author discusses the idea of 'merging media'. A concept where many forms of culture, profession and entertainment are actively crossing into each other, creating novel collaborations. One of the main catalysts to this merging is video games. With the rise of the digital age, merging video games with other media has become exceedingly convenient, thanks to digital compatibility. The field of architecture included. Architects have dabbled with computing tools to create virtual environments since the 1960s with the advent of the Sketchpad program. Architecture currently is synonymous with digitalisation in practice, which naturally bleeds into new media such as video games (Indaverea, M. A. P. 2019). This journal explains the organic way video games have increased in relevance across various digital medias. The onus is on academia to develop learning programs tied to the trend. Ambitious Western European architecture schools have already incorporated BIM, virtual reality, augmented reality, digital fabrication, and various virtual learning tools into their teaching matrix. The Bartlett School of Architecture, UCL even has a Cinematic and Video Game Architecture program on offer for their MArch students. This is indicative of a rising demand to future-proof learning for a generation of tech-inclined students. The absence of virtual environment design programs in Malaysian architectural academia is disadvantageous.

In the publication titled 'Architectures of Deviation: Exploring the Spatial Protocols of Contemporary Video Games', the author argues that creating environments in video games can bring forth more creative freedom as the virtual space is not tethered to the confines of reality. Elements such as gravity, context, cost and legal obstructions play no role in shaping virtual built-environments (Pearson, 2015). Despite the interchangeable skills and general design principles between real and virtual architecture, designing video game environments is distinctly different from conventional architecture. Video game philosopher Espen Aarseth stated that game designers embrace that severance from reality. It is to allow deviation from conventional ways of design and transcend into making playable spaces instead (Aarseth, E., 2000). According to another gaming philosopher Ian Bogost, the game that rules itself lends to a procedural rhetoric that heavily influences the end design. This 'procedural rhetoric' is a design factor non-existent in the material world. It

describes how the virtual environment is shaped by the way the video game is played. All this indicates that there is an unaccounted number of differences between design philosophies of the virtual and real built-environments. These articles are encouragement for the research purpose.

User interaction is key to video game architecture, as the structures need to exude meaning to the players. Architecture in a video game is heavily calibrated to suit the playing system of said game, and the playing systems in question can be incredibly diverse. Most immersive video games apply the 'half-real' concept to shape their architecture. In order to emanate some tangibility to the gaming world, the half-real concept interplays between fictional settings and the application of rules found in the real world. As a result, new design methods are being formed to analyse video game environments better in order to expand related studies (Pearson, 2018). This journal directly inspires the research gap. By contrasting the architecture made in video games against real-life, what key differences in city attributes and design approach could be uncovered? The 'half-real' approach for highly immersive video games also makes real and virtual architecture highly comparable despite their differences. A common ground can be established as a foothold to launch the study.

The Human Scale, a 2012 documentary that explores the works and philosophies of Jan Gehl provides purpose to the research. This documentary delivers a thorough assessment of how modern-day cities are so poorly put together. Jan Gehl's argument about modernism being the root cause of an architect's callousness towards urban design, makes the search for an alternative approach even more vital. Along with the critiques, the documentary also features urban design improvement initiatives by the legendary urbanist. One city that featured as a testing ground for his urban design revolution is New York City. The documentary shows how Jan Gehl encourages a complete re-think of how urban design is approached. That when focus is given to the more humane aspects of a city, the proposed design solutions leave actual impact (Gehl, J., 2023). Jan Gehl's emphasise on humane factors to elevate the built-environment, is curiously akin to video game level designers that prioritise joy as an end product. The fascinating dissection of New York in the documentary, made the city a strong research subject candidate.

3.0 METHODOLOGY

The philosophy of Jan Gehl is not only a catalyst for the study's purpose. It is also key in selecting the city at the center of the study. The urbanist has dedicated his time towards humanising the New York city streets. In collaboration with the New York City Department of Transportation, Jan Gehl documented the poor state of the city's urban environment, the potential it has to improve, and design suggestions to make it happen. A public life survey conducted on the populace determines that the city suffers from various detrimental urban design traits, including cramped sidewalks, streets without seating, unsightly construction areas, dangerously secluded public realms and a severe lack of stationary activities (Gehl, J., 2018). New York City is the poster child of Jan Gehl's criticism of modern cities. It is therefore an ideal subject to observe, in order to understand the physical determinants that makes a typical yet troubled modern city.

The selected research sample then requires a virtual counterpart for the study to develop. In this case, a New York City modelled in virtual space. The virtual city must be from a three-dimensional open-world video game, where an avatar can explore the built environment. This is to ensure the virtual city is as comparable as can be to our three-dimensional reality. The video game chosen must also be significantly popular to ensure an abundance of testimony and data for the study. Therefore, the selected virtual counterpart is the New York City of Marvel's Spider-Man PS4 (2018) video game. Marvel's Spider-Man is the preferred video game due to the critical acclaim of its city immersion and gameplay. After its release, the video game has received a total of 77 award nominations with 12 wins. Among the accolades were two category nominations from the New York Video Game Awards. Real-life New York also has the distinction of being the city that has the most video game iterations at 450 games (Molloy, P. J., 2023). The focus area of the research will be the Times Square. It is ideal for data collection as it is the most visited part of New York, drawing 50 million visitors a year. It is also traversed by 300,000 pedestrians a day and is one of the most photographed locations in the world. Times Square is also faithfully recreated within the video game.

The research is qualitative in nature, as the discourse will revolve around city aesthetics and the feelings they invoke. The objective is to identify comparable physical attributes from both real-life and virtual New York. The research begins with a document analysis of the publication, 'Image of a City' by Kevin Lynch. Kevin Lynch's five elements that make up a city, provides the groundwork to determine comparison categories between both researched cities. Once the line-up of categories has been decided, an observation study will be

conducted for both cities. For the real-life New York City, an unobtrusive study will be conducted to obtain images of Times Square relevant to the selected comparative categories. Observation tools such as Google Earth and Google Street View will be utilized to get accurate images of the city. To mitigate Google Earth's inconsistently updated satellite images, earth.com is accessed to view live footage of Times Square for up-to-date visuals. For the New York City in Marvel's Spider-Man game, the city will be observed using the video game avatar. The playable character will be used to traverse the virtual Times Square area, while recording city elements relevant to the comparative categories. The collected data from both cities will then be subjected to a comparative analysis. The resulting comparative matrix will identify patterns of similarities and differences in the physical attributes of both real and virtual cities.

3.1 Document Analysis

'The Image of a City' by Kevin Lynch is studied in order to inspire the visual identification of the cities being researched. 'Chapter 3, The City Image and its Elements' is the main source of inspiration. According to Kevin Lynch, the physical identity of a city can be broken down into five categories. They include paths, edges, districts, nodes and landmarks (Lynch, K. 1960). These elements are the key determinants to be used in the research, except for districts. The district element is too culturally tied, while the research focuses more on the tangible, physical aspects of the city. There are many other elements that determines a powerful city image but is omitted from the study in the same way. Factors such as a structure's history, value and relative importance is irrelevant at this stage for not being tangible enough.

The first element studied is the paths. Humanely scaled cities must be bustling with pedestrian movement, and the network of paths across cities are the veins that allow these movements to flow. Paths are navigation mediums and are key to how we experience cities. Paths also forge connections across the built- environment, enabling more interaction between its inhabitants. On the contrary, cities with lesser foot traffic lessens the safety of said paths due to the lack of cross surveillance. A city with abysmal foot traffic is also less economically active. Elements to look out for within the research samples are roads, pedestrian crossings, side-walks or bridges. Modern cities are also shaped by their road geometry. Every other element of a city comes after the fact.

Edges are physical elements that form boundaries within a cityscape. Edges can come in many forms: natural, artificial, seamless or brash. Natural boundaries include rivers, coasts and forest edges. Artificial boundaries are human constructs that were not intended to serve as boundaries such as buildings, highways and railways. Edges could also be more of a perceptive element, such as differing architectural styles, building usage and activity typology. The research however will focus more on the visual and literal city boundaries. When not designed with the human experience in consideration, edges can create discomfort such as having a housing area immediately bleed into a highly industrial one. It is important to note that edges are also easily interchangeable with 'paths'. A road could be an edge for pedestrians, while clearly being a path for truck drivers for example. The research will determine edges and paths through the lens of pedestrians for consistency.

Nodes are strategically positioned intersection points across a city that serves as a hotbed for interaction. It can also bridge together different types of city functions and activity. It is the most dynamic and bustling among the many attributes that make a city. Nodes can be anything from significant road intersections and train stations, to plazas and parks. If paths are the veins that enable the circulation of pedestrians to flow, nodes are the beating hearts that pumps a city to life with human activity. A successful node is magnetic enough to attract people from far and wide. This encourages a healthy dose of cultural exchange and a stronger economy. Physically, nodes can be identified as urban points where structures or circulation pivots and shifts. Transitional areas where the purpose changes, or when different usages intersect.

Landmarks are characterised by being instantly identifiable. They are not necessarily beacons of activity and vibrancy, but they make important visual markers for people to navigate around a city. A landmark can be both natural and artificial. Natural ones could be lakes or hills, while artificial ones can be any stand-out building, infrastructure, or art installation. A landmark has to embody three key qualities. It must be readily visible even from a distance, unique, and significant. Whether they are historical, political or cultural, landmarks are symbols of the city they reside in. Its population generally cherishes it, and it is a form of meaning manifested as an urban element. The long-distance landmarks will be excluded from the research. Only those within the immediate Time Square area will be documented. Specifically, a 400meter radius area

with the Times Square bowtie road (Figure 2) as its epicenter. It is an iconic point in the cith where Broadway and the 7th Avenue intersects. The study area also seems devoid of natural landmarks as it is in the heart of the city, surrounded by towering buildings all around.

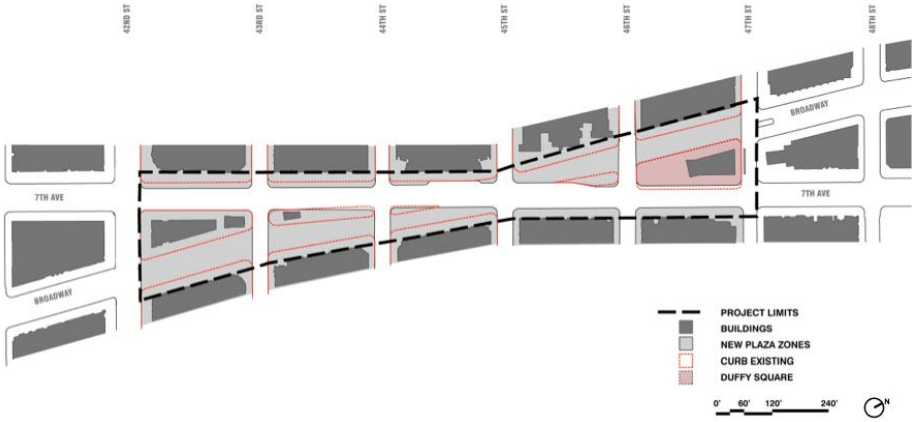


Figure 2. The Times Square Bowstring Road. Source : Stellenbosch Heritage Foundation

Chapter 1 of Kevin Lynch's book discusses the 'image' of a given environment. A built-environment is massive and cannot be comprehended or perceived by a single individual in one go. Cities are perceived temporally. Gradual sensory absorption as the pedestrian travels across the urban fabric. This information is then processed and projected by the individual as his 'image' of the city. The higher the quality a physical construct has, the higher chances it will evoke powerful imagery for the individual experiencing it. This is dubbed 'imageability' (Lynch, K. 1960). Ultimately, the point of identifying the physical elements that defines a city (Figure 3) is to gauge its imageability. Therefore, the physical attributes will not only be merely catalogued. The quality of those identified physical attributes will also be assessed. The research sets out to determine the imageability of both real-life and virtual New York using the same yardstick. When the physical determinants of a city can be applied to both versions of New York, this becomes a nexus where transferable design solutions between the two realms is a real possibility.

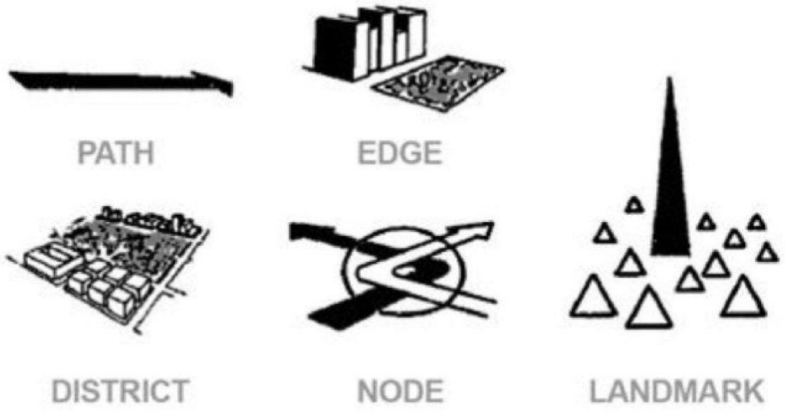
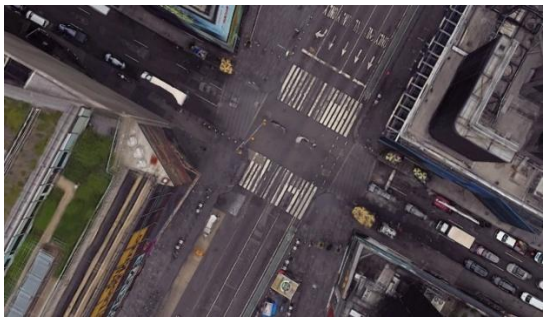
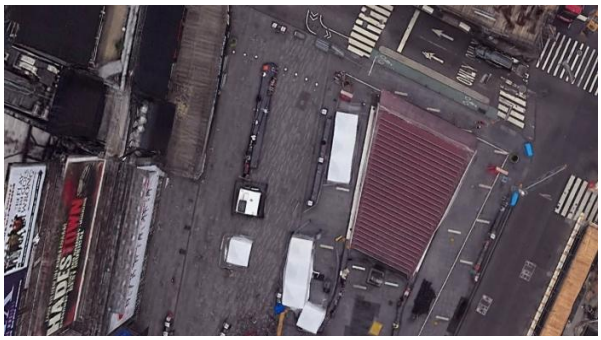


Figure 3. The five elements of a city by Kevin Lynch

3.2 Comparative Study

Research on the architectural nexus between real and virtual built-environments has precedence. Luke Pearson for example, aims to merge the computational visualizations of video games with real project sites. The research sets out to analyze video game environments with the scrutiny typically subjected to real projects in practice (Pearson, 2020). This comparative research also aims to contrast real and virtual constructs using the same visual identification device for both. The paths, edges, nodes and landmarks will be observed and identified. Upon identifying the physical city attributes, discussions will be made regarding any design liberties taken towards shaping virtual New York. The design changes must be within any of the four comparison categories to warrant a discussion. This is an inception for the future of the research, where studies regarding video game sourced design methods take center stage.

Table 1. New York City Physical Elements Comparison (Paths)

New York City in Marvel's Spider-man (Virtual)	New York City (Real-world)
Carriageway Profile  • Virtual Times Square's 7th Avenue has a 4-carriageway system. • The east-west streets have only 2 vehicle lanes. • Does not include bicycle lanes. • Visually juxtaposed with vibrant broadwalks for a clearer road geometry.	Carriageway Profile  • The real-life New York has roads with a 6-carriageway system. • For Times Square it's the 7th Avenue that has this carriageway. • Streets carry traffic for east-west orientation. Some streets carry heavy two-way traffic and are 100 feet wide, with 3 car lanes. • Typical vehicular paths comprise of 55-60 foot roads with 20-22.5 feet sidewalks. • Grey-ish broadwalk finishes makes the road and pedestrian paths indistinguishable.
Broadway  • The Broadway path has a vibrant floor finish. Terracotta colors to stand out from the roads and sidewalks. • The Broadway path is adorned with playful finishing throughout. • The path follows a row of illuminated digital billboards, mimicking the vibrant image of its real-life counterpart.	Broadway  • Real-life Broadway path is clad in large grey tiles that seem to drown the path into its noisy backdrop. • The sidewalk and Broadway path is indistinguishable due to the similar, muted grey floor finish. • The path is iconic due to the lines of digital billboards illuminating the path. • Installed urban furniture is beneficial and popular among visitors.

Pedestrian Broadwalk	Pedestrian Broadwalk
	
• The virtual pedestrian walkway is juxtaposed with the Broadway path to visually lift up both. • The broadwalk is distinct from Broadway not just color wise, but tactile too. Using larger square tiles against the smaller mosaics of Broadway's path. • The clarity in zones seamlessly establishes the broadwalk for traversal, while Broadway leisure and other activities.	• Grey is a very subdued color. Having both Broadway path and the broadwalk clad in grey stone tiles makes both unnoticeable. • The two paths in real-life is only distinguished by a slight curb. • Visually muting both paths negates the importance of the iconic Broadwalk to pedestrians. • Activities and street furniture are present on both Broadway and the broadwalk, increasing street vibrancy at the expense of an unobstructed circulation.

Table 2. New York City Physical Elements Comparison (Edges)

New York City in Marvel's Spider-man (Virtual)	**New York City (Real-world)**
Broadway Digital Billboards	Broadway Digital Billboards
	
• Digital billboards vibrantly marks the edges of Times Square, like in real-life. • The billboards can also be found along the streets, away from Avenue 7. Most likely to cater to the game player who can swing between buildings. Continuing the visual vibrancy despite moving away from the main Times Square. • The billboards at the side of the buildings adds visual depth to the city blocks. The building forms apparent, despite the screens.	• The digital billboards illuminating real-life Times Square especially at night, is a signature trait of this iconic city image. • The billboards are exclusively directed to the main avenue. Logical from an advertisement stand point to be visible where the most crowd is gathered at. • While the city edge is visually vibrant due to the screens, it is flat tactile wise as the array of level billboards blocks out the form of the architecture it is attached to.

Digital Billboard Level

- The billboards for virtual Times Square can even be found on ground level.
- This creates an edge that is interactive and can almost function as a node.
- The design change from real-life Times Square is probably influenced by the ground level being the heart of pedestrian activity.

Digital Billboard Level

- The digital billboards in real-life Times Square are positioned way above the human vertical field of vision.
- The purpose is to target the view of people from far distances.
- Design scale that doesn't cater to the immediate pedestrian within the urban space in question, is a flagship criticism of modern cities.

Lighting Barricade

- The virtual street has lighting installations replace the steel bollards used in real-life.
- Creates an edge that is visually fun without compromising safety functions.
- It can be argued that the barricade becomes more visible due to this, making it function more effectively if it replaced the real-life steel bollards.
- Huge planter pots are also used to create soft edges that is a welcome contrast to the concrete jungle of New York.

Steel Barricade

- Real-life Times Square was subject to a huge pedestrianization initiative in 2014.
- Prominent areas were made car-free, and safety measures need to be installed to avoid clashed between vehicular and pedestrian circulations.
- Steel bollards line up across the Broadway path whenever it gets cut off by roads, for safety purposes.
- The steel bollards however look uninspired and cold. The metal color seemingly blends into the already muted grey tiles, coalescing into an indifferent city image.
- The barricade forms an important safety edge for pedestrians, but it comes at the expense of the physical quality of the city.

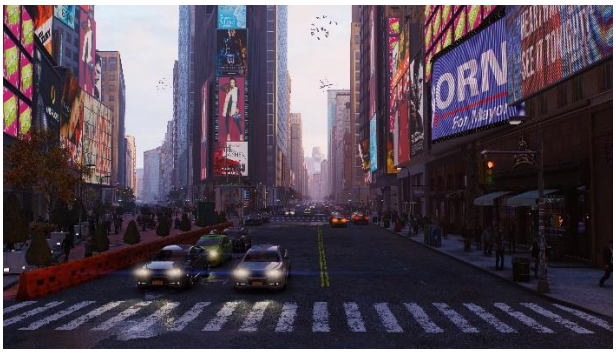
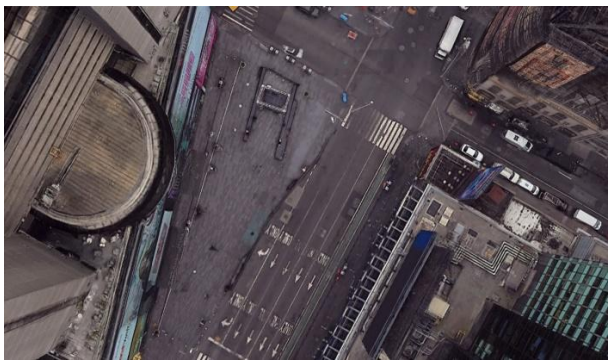
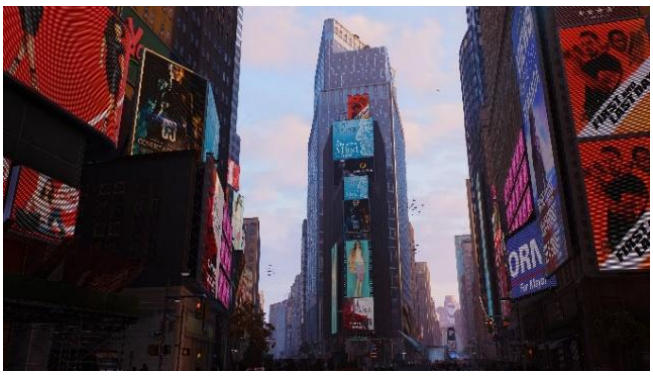
Building Edges	Building Edges
	
• Much like real-life Times Square, the edges of this area are strongly defined by the building blocks. • The flank of skyscrapers works together to frame the iconic One Times Square building against the sky. • This brilliant use of city blocks proves the versatility of urban edges when used right. Edges do not merely block and barricade. Edges can create illusions of infinity and seamlessly highlight important landmarks of a city.	• With only a few size discrepancies, the building edges in real-life did not change much when adapted into the video game. • This is a testament to how the building edges of Times Square is already dramatic enough to evoke strong feelings from visitors.

Table 3. New York City Physical Elements Comparison (Nodes)

New York City in Marvel's Spider-man (Virtual)	**New York City (Real-world)**
Broadway Bowtie Road	Broadway Bowtie Road
	
• The bowtie road is the center of Times Square. The virtual city highlights this by juxtaposing the finishing material of Broadway and 7th Avenue's asphalt. • The surface treatment highlights the intersection between two different circulation types at this specific point, reinforcing it as a significant city node. • The triangle plaza marking the intersection is made visible thanks to the path duality.	• The bowtie road could well be the first ever node for Times Square. • Throughout all of Manhattan, this bowtie intersection between Broadway and the 7th Avenue is the most popular. • The dull Broadway floor texture that barely separates itself from the road, creates an insecure piece of space with no indication of its history and significance.

Father Duffy Square 	Father Duffy Square 
• The virtual Father Duffy Square is built almost identical to the real-life square. • The real-life square is an urban revitalisation success. The video game version does not see much need to change the square, although the surface treatment of the plaza falls under scrutiny. • The Broadway path stands out against its surrounding due to the vibrant treatment of its surface. • The pop in color effectively yet seamlessly declares the plaza as the most important node in the city. • The Father Duffy statue is curiously removed for the video game version of the square.	• Father Duffy Square is a 2000sqm node at the heart of Times Square. • It is the point of convergence for many activities and demographic. Visitors can hang out, eat, jog, rest and even purchase a theater ticket here via the TKTS booth. • The wide, open space is a welcomed visual break from the dense concrete jungles of Manhattan. • The Father Duffy statue and TKTS booth, fondly known as the Red Stairs, are iconic city landmarks found within this urban node.
Circulation Intersection 	Circulation Intersection 
• The virtual City takes a lot of care in visually treating traffic nodes. • The termination between pedestrian and the road comes in very visual ways. • Physical elements defining the traffic nodes include lines of planter boxes, which helps visually soften the city too. • The obvious changes in surface treatment clearly marks the presence of a traffic node.	• Due to Times Square's pedestrianization initiative in 2014, there are many cut off points between roads and pedestrian crossings. • These intersection points might not be as glamorous as the prominent plazas but are city nodes regardless. • Real New York treats these areas as after-thought, relying on construction cones and temporary barricades to demarcate the area.

Table 4. New York City Physical Elements Comparison (Landmarks)

New York City in Marvel's Spider-man (Virtual)	New York City (Real-world)
One Times Square 	One Times Square 
• Apart from subtle size changes, the virtual One Times Square is modelled relatively the same as the real-life inspiration. • The building also serves as a bearing check for gamers traversing the virtual city.	• The One Times Square is the most important landmark in the whole Manhattan district. • It is the most recognizable building in Times Square. • One Times Square is the site of the new year ball drop. The famous new year celebrations with a tradition dating back to 1907. • It is used by pedestrians to check their bearings. • The building marks the southern edge of Times Square.
Two Times Square 	Two Times Square 
• Apart from subtle size changes, the virtual Two Times Square is modelled relatively the same as the real-life inspiration. • The building also serves as a bearing check for gamers traversing the virtual city.	• The building represents the northern edge of Times Square. • Used by pedestrians to check their bearings. • Stands at 400meters across One Times Square, with the entirety of Times Square sandwiched between them.

TKTS Steps	TKTS Steps
	
• The in-game Red Steps is an almost identical adaptation of the real one. • The design tweak to the landmark includes adding a landing between steps, and a platform at the top of said steps. • If translated to real-life, this design change would allow more people to comfortably scale the steps, take breaks and enjoy the view longer from up there.	• The famous Red Steps of Times Square is actually a booth for TKTS to sell discounted Broadway show tickets. • A clever way to save space by having the booth double as an urban furniture. • The bright red color scheme visually contrasts the landmark with its dull and grey plaza surface. • The Red Steps combines with another landmark behind it (the Two Times Square) to create a dramatic vista, making the spot a favourite for photographers.

4.0 RESULTS

4.1 Physical Attributes of Real and Virtual Cities

Figure 4. Spider-man is synonymous with unique ways of traversal. Photo by Marvel 2019

The most obvious difference between the two cities can be seen when the paths are compared. The grid of roads cutting through city blocks is a hallmark of New York City. However, it is also the most problematic aspect when a city image is concerned. A city designed with vehicles as priority makes the city image suffer. Although urbanization initiatives from 2014 have made the city more pedestrian friendly, the streets are still overcrowded and the roads have no choice but to be an arena where vehicles and pedestrians jostle for space. Unsurprisingly, the video game level designers decided to reduce carriageway and simplify road geometries to make the virtual city less chaotic. Apart from the form of the roads, the aesthetic treatment of the paths

between both cities cannot be more different. Real-life New York wasted its pedestrianization efforts by reverting to bland grey tiles despite the do over. This makes whatever new pedestrian path being created looks no different than the asphalt roads afflicting the city. The Times Square within the video game is unapologetic with geometric patterns and colors defining the Broadway pavements. Clearly marking the path as a trail of joy and activity. The level designers are particular about the surface treatment of their virtual New York. This is likely attributed to a traversal consideration not available in reality. The titular Spider-Man character can scale walls and swing between buildings within the virtual city. It is therefore imperative that level designers consider a bird's eye view constantly when refining the virtual urban environment (Figure 4).

Both cities have similar building edges. This is one of the few things that remained practically untouched when the virtual New York was developed. Times Square in reality is organized so dramatically. A valley of skyscrapers opening up to the sky at the end of the tunnel, with the One Times Square at the center of that sky frame. Focused and imposing. This is the kind of city imagery that sticks in the memories of visitors. A powerful physical quality of the city that it requires no tweaks, just a faithful recreation for the video game version. Apart from the building block arrangements, Times Square is also visually famous for its 300 or so digital billboards lining up Broadway. While this is another powerful imagery of the city, the excess of screens replaces the surrounding architecture with big flat surfaces. The level designers decided to wrap the billboards around the buildings instead, so the silhouette of individual blocks can still be perceived. The digital billboards are also strung so high up in real-life, away from the field of vision for pedestrians within the immediate area. Between this and the hiding of architecture behind screens, the iconic wall of billboards adorning Times Square also acts like an indifferent city edge that refuses to engage the populace. This mishandling of the billboards can be attributed to a sole focus in commerce. The city sets out to feature as many as possible advertisements, to be placed as high as possible for maximum visibility. The city ends up alienating its inhabitants by being so out of scale. For the virtual Times Square however, the digital billboards start from the pedestrian level. This would create nodes in real-life, that interacts with people from the immediate proximity. This study has shown that edges does not have to be limited to barricades. When designed with human considerations, even edges can be a captivating contribution to the city image.

Several city nodes were identified for the comparative study, but the treatment of the bowtie road was the most telling. The bowtie road which intersects Broadway with the 7th Avenue is beyond historic. It also is the epicenter of Times Square. It is the convergence of both vehicles and pedestrians. A bustling crisscross of circulation at the genesis of everything. But you could not tell this is so by simply looking at the real-life bowtie. The road geometry gives a hint of the bowtie, while the rest of it is muddled with walkway floor tiles that blend in with the grimy roads. The same can be said for the surface treatment of the Father Duffy Square. A bustling open space connecting the entirety of Times Square together, yet surface treated like it is the parking lot of a grocery store. The video game version of both nodes however is a real visual treat. Bright pavements that contrast the muted environment, further enhanced with patterns of various geometry and huge planter pots to soften up the concrete jungle. The bowtie road and Duffy Plaza instantly looks like they match their storied history and importance towards the city. Urban nodes are crucial parts of the city that pivots, transitions or juggles multiple human needs and functions. It is not a stretch to say that nodes deserve to be treated as physical features with the same import as landmarks. Some would argue that these two are the same even. If a memorable city image is typically tied to its landmarks, then disregarding big city nodes would be to the detriment of the city instead.

Landmarks are fundamental to the process of recreating a virtual New York City. The design process starts off with the identification of prominent landmarks and nodes. These selected landmarks are then locked in position as the less prominent surroundings get procedurally generated by a 3D software. The landmarks are scaled up and positioned roughly accurate to their locations in reality. This is how level designers seemingly recreate carbon copies of cities virtually, when the actual changes are practically unnoticeable. This is how level designers retain immersion despite the virtual city not being a New York clone (Benavidez, J., 2019). In the particular case of Times Square, the three vital landmarks identified are the Red Steps, One Times Square and Two Times Square building. These landmarks are so visually important to New York in real-life that they transition into digital versions with barely any changes. The One Times Square and Two Times Square

buildings are also visuals marker for the South end and North end of Times Square respectively. These two landmarks have assisted wayfinding for both real pedestrians and the traversing avatar of the gamers. A powerful physical attribute displayed by the landmarks, that they could benefit both the virtual and real world in similar fashion. The only landmark tweak by level designers was towards the Red Steps. The video game version sees the addition of landings on the steps that would encourage more visitors to interact with it.

This research has scrutinised the physical attributes of both cities using the same parameters. Ultimately the findings from this comparative study shows that the fundamental difference between the two are their developmental goals. New York was built out of economic demands and continues to function so. Its video game counterpart instead hopes to create an impression of New York city that is fun, engaging and exciting to explore. The terminology used when setting goals for video game environments are often qualitative in nature. How does the environment impact the narrative? What emotion would the setting convey to the players? What surprises and mysteries are there to be discovered within the urban fabric? How is this space special compared to others before it? All questions would lead to a quality city image if followed through. While one could argue that the schematic phase for real architecture projects heavily discuss these themes too, it is taken to a whole different level of scrutiny for video games. Real developments without a strong concept would still be buildable, provided all technical bodies approve of the design submission. Video games instead treat qualitative goals like actual building submission objectives. Because unlike real urban developments, video game cities are not meant to be forcefully lived in no matter how depressing. Real life architectural practices have people being shoved into environments built from sweeping generalisations, but unquestionably followed because it is written in a handbook (Souza, E., 2020).

5.0 DISCUSSIONS

By studying the attributes of both virtual and real New York city using the same metric, the effectiveness of open world video games in facilitating architectural exploration cannot be denied. Marvel's Spider-man is a critically acclaimed video game due to its immersive, digital reconstruction of New York City. The success of the virtual city in exuding a sense of familiarity towards actual New Yorkers is a testament to the compatibility a video game has as an architectural learning tool. Jacinda Chew, art director for Marvel's Spider-man provided valuable insight into the design of the game's version of New York city. She claims that level designers of the video game have probably come to know the city even more intimately than New York natives. The players view the virtual city through the lens of Spider-man, a comic book character that can scale walls and skyscrapers. The necessity to then define roof top areas and urban blind spots, provides level designers with a more in depth understanding of the city compared to life-long New York natives. Reconstructing real cities within a virtual space not only makes use of transferable skills and design nuances possessed by architects and level designers. Video game cities that are immersive, might have the potential to add to the knowledge of architects for real cities. If the physical attributes for the cities in both realms are comparable, then the skills, nuances and principles of video game design can be taught to budding architects.

While both virtual and real New York has relatively the same city determinants, the science behind designing a virtual New York is fundamentally different to its counterpart in reality. The virtual city is crafted with considerations not applied to the making of actual built-environments. This includes the usage of the MDA Framework. A design guidance tool with the evocation of fun as a serious end goal. While real-life New York city is trying to address its traffic congestion and pedestrian safety (Tankel, S. B., 1969), their virtual counterpart holds user experiences, emotion and visual aesthetics in exactly the same regard. The disregard for causal hurdles allows video game level designers to focus on designing the best experiences an urban space can offer. The way designing video games prioritises intangible results such as 'fun' has to be the most crucial characteristic to bridge with reality. Kevin Lynch argues that the act of designing is the creation of an artificial world. Since we have the choice to build a whole city from scratch, it makes perfect sense to develop a habitat which is a work of art that also caters to a wide array of human purposes. Why would one knowingly make built-environments that does not cater to the human perception and senses? The MDA Framework used to guide video game designs seemingly addresses this very real urban design concern.

Another design tool unique to virtual constructs is the half-life approach. This is also applied to the formation of the video game's version of New York. This concept blends game play, game mechanics and visual themes with real life inspired settings in order to create immersion amongst the players (Pearson, 2018). It is a misguided assumption that technological limitations are hampering level designers from making exact carbon copies of real cities within video games. According to Jacinda Chew, making an exact replica of New York city within the game was never the intention. The idea behind the virtual New York city was to create immersion through impression. To capture the key physical attributes of New York, from its towering skyscrapers to the grimy fire escapes in back alleys. The design should capture enough visual essence of the real New York city, until the virtual city becomes 'New York' enough even for those who has never visited in the flesh (Chew, J. 2018). This half-real design approach provides leeway for design liberties to take place, without sacrificing the immersion of being in actual New York. By embodying aspects of both the real and virtual city, in-game cities might indeed contain an abundance of novel urban design strategies. Strategies that are potentially applicable towards designing real cities too.

Apart from the different paths taken by architects and level designers, the research also makes observations towards shared design qualities. One of the catalysts for this research is Jan Gehl's criticism of motorism as the root cause for poorly scaled cities. This critique of the modern city becomes even more credible through this research, with how New York was adapted into the game. Insomniac, the game developers behind the virtual New York city intended to make an iteration of New York that is more engaging, interactive and visually comfortable. The main aspect of real New York that had to be tweaked was indeed the vehicular circulation network. According to Insomniac senior designer Josue Benavidez, the design team almost immediately set out to reduce the traffic clutter famous to New York. With player traversal in mind, the level designers simplified the street geometry of virtual New York city while also reducing the mess of streets and avenues. Individual road widths are also reduced from 6 carriages to 4. A clear statement that vehicular circulation does indeed make or break the human experience within a city. Despite coming from different worlds, reducing the presence of vehicular circulation in game almost feels like a direct response to good urban design practice in real-life. This observation puts forward a question relevant to the next phase of the research. Should design sensibilities in-game, that are similar to real-life still be researched? Or the focus should be purely given to in-game design methods that are completely alien to real-life city design? The research does intend to discover transferrable design traits between the two realms, and the similarities delivers. But the research is about finding novelty too, which likely lies in design methods endemic to video games. Can design ideals that are similar for designing real and virtual cities, produce something new despite the apparent predictability?

6.0 CONCLUSIONS

This research means to highlight the potential that video game level designs have in providing new philosophies for urban design pedagogy. The research sets out to identify key physical attributes that makes an evocative city image. Through the comparative analysis between real and virtual New York City, a number of these video game design considerations with reality compatible applications are identified. The potential for in-game design philosophies to be applied to real world developments, is precisely the gap in knowledge this research means to understand. The research has shown that level designers from Insomniac took a series of design liberties when constructing their virtual iteration of New York City. The design changes to improve gamer experience revolves around down-sizing vehicular traffic, simplifying street geometry, increasing landmark presence and tuning a more dramatic city skyline just to name a few. While identifying the precise tools level designers use to make these design liberties requires separate research altogether, the intention behind said changes can be traced back to the MDA Framework. A design guideline prioritizing emotions and fun naturally producing more humane recalibration of the urban environment.

Despite being in the entertainment industry, video game level designers undeniably address the modern city criticisms by architects and urbanists. Level designers are more in tune with the humanity of a city compared to modern day developers and architects. The research has shown that a video game's severance from reality can lead to a more qualitative approach in designing cities. Video game level designers dedicate more urban design considerations towards the human experience, although this is admittedly made easier with

reality constrains not getting in the way. The benefit of hindsight for level designers in adapting already built cities, is also an advantage that needs to be kept in mind. At the same time, present day architects are still bogged down by the same issues that have blighted modern city designs for the past 50 years. Top to bottom developments that design cities for cars instead of people. Modern architects design cities with a gross oversimplification of scale by way of pre-determined ergonomics, that many nuances of the human psyche are left missing from the resulting environment (Lindgren, T., 2024). When video game design sensibilities are applied to remake its own New York, the image of the city moves closer towards the idyllic visions of Kevin Lynch. To shed light on the research gap, all evidence points to the mentality of level designers when making virtual built-environments.

The vision for this research is to compare more cities against their virtual counterparts, in order to unveil even more physical determinants that positively contribute to an evocative image of a city. Future research samples must also include exemplary cities for a change. Car free cities with a video game counterpart such as Venice is a prime candidate for future research on the matter. The increase in sample numbers and flip in the selected city dynamic will yield even more valuable data to further refine the study. The next phase could also reinforce or argue against the current findings of this research. A more accurate gauge on the topic will be achieved either way. The collective data will hopefully convince the Malaysian architecture academia to look towards open world video games when formulating learning programs that combat the status quo of poorly scaled modern cities.

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