ARCHITECTURE AT PLAY

The Magic Circle and Flow in Video Game Spaces

by

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I hereby declare that I am the sole author of this thesis. This is a true copy of this thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

ABSTRACT

Video games are a part of modern culture. As video game spaces begin to enter a new generation's spatial lexicon, it is important for architects, curators of spatial design, to understand this new medium of space. This thesis aims to introduce two concepts specific to video game design, the magic circle and flow, to architects as a means of understanding the design of video game spaces.

First coined by the Dutch historian Johann Huizinga in *Homo Ludens*, and later adapted by video game designers Katie Salen and Eric Zimmerman, the magic circle refers to the boundary created by the rules of a game that separate reality from the fantasy of the game. Within the magic circle, the rules of play can transform and give new meaning to spatial organizations that could be considered problematic in real world architectural design.

Flow is a psychological concept introduced by Hungarian psychology professor Mihály Csíkszentmihályi. When completing a task, flow occurs when both the skill level of the participant and the challenge level of the task are equally high. When a state of flow is achieved, the task becomes enjoyable and can be carried out indefinitely until the balance is broken. Effective video games spaces are specifically designed to contribute to flow experiences, while ineffective spaces can make a game too easy or too hard, creating a boredom or anxiety for the player.

Through a series of explorations and video game case studies, specifically in the first-person and third person shooter genre, this thesis first observes the transformation of implied spatial meanings in the magic circle. It then introduces the unique spatial languages used to generate spaces that support the creation of flow alongside the gameplay and narrative of a video game. This thesis culminates with the design and execution of an original capture the flag map created with the Unreal Engine that tests the concepts of the magic circle and flow in video game spaces. As video games become increasingly ubiquitous, this thesis acts as means of entry for architects to understand the unique properties of an emerging form of spatial design.

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A big thank you goes out to my parents, Alex and Sherry Sin for their constant support, encouragement, and love. I would also like to thank my brother, Court Sin, as well as my great friends Eric and Robert Chan for introducing me to the wonderful world of video games.

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DEDICATION

For my parents, for making sure I didn't play too many video games.

This thesis is dedicated to the memory of my grandfather, Gung-Gung.

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PREFACE

My name is Terry Sin and I have played video games since I was about five years old. In the early nineties, my brother Court and I had a Chinese imitation of the Nintendo system. We used to play strange knock-off versions of popular games and even stranger Japanese original games. Even though I rarely won against my brother, I still enjoyed the act of playing in these new virtual worlds. From then we moved onto the Gameboy during long car rides, taking turns with Tetris and Solar Striker. Although we never had the latest and greatest systems and games, there was always a friend's basement that did. Our family friends, Eric and Robert Chan would regularly have us over on the weekend where we would team up for Teenage Mutant Ninja Turtles II for the Super Nintendo. In later years we became introduced to the world of PC gaming by the Chans. True nerds at heart, they had multiple computers that allowed us to play the first LAN multi-player games, facing off each other in Duke Nukem 3D and Jedi Knight. This introduction to the first person shooter set me on to a path I have still not strayed from today. While my brother would go on to other interests, I have never stopped playing video games. Video games mean a lot to me. They provided me with an outlet for fantasy and imagination in the dull cul-de-sacs of Mississauga, Ontario. Especially with first person shooters and other action games, video games gave this meek Chinese boy a chance to be a hero and explore fantastic worlds. While much of this thesis draws from professional accounts of video games, many of the ideas and concepts introduced in this thesis are drawn from personal experience. I have probably been in more famous video game spaces than I have famous works of architecture, as have many people around the world. Every gamer's experience is different, and this thesis is a reflection of my own.

1 | INTRODUCTION

Video games are no longer a subculture, but rather a part of modern culture itself. Gamers are not just the stereotypical prepubescent boys playing in their parents' basement. Currently, 72% of American households play computer and video games. The average age of a gamer is 37 years old and 42% of all gamers are female. As more people are introduced to video games and are raised with them through adolescence, the video game industry will only continue to grow. The video game industry is very much an industry. In 2010, consumers spent a total $25.1 billion on the games industry, with 257.2 million units being games themselves.[1] With so many people playing games, it is inevitable that video games are adding to a new generation's understanding of space.

In recent video game design literature, two concepts have arisen to both explain and contribute to the remarkable holding power of video games: the magic circle and the flow. First coined by Johann Huizinga's *Homo Ludens* (ludo meaning "play" in Latin) in 1938 and now adopted by video game designers, starting with Katie Salen and Eric Zimmerman in *Rules of Play* as a blanket term, the magic circle refers to the metaphorical boundary around a game that separates the real world and the world of play through the rules of the game. With the creation of an effective gameplay or narrative device, a regular space can be transformed into a magical space of play that defies preconceived notions. Flow is a psychological concept and mental state proposed by Mihály Csíkszentmihályi. When completing a task, flow occurs when both the skill level of the worker, player, etc. and the challenge level of the task are equally high. When flow is achieved, the task becomes enjoyable and can be carried on infinitely until the balance is broken. Flow is an essential concept in keeping players motivated and immersed inside a game. This thesis exposes how the rules of play transform spatial meanings within magic circles and how specific spatial types can then contribute to the creation of flow in these spaces.

[1] All statistics from *The 2011 Essential Facts About the Computer and Video Game Industry* released by the Entertainment Software Association (ESA) at E3 2011.

While video games are a relatively new form of media, they are quickly flourishing to merit rigorous research and analysis in various fields. Although video games act primarily as a form of entertainment, their rapid integration into modern culture have brought video games to the attention of media analysts, psychologists, and marketing experts. A quick YouTube search for TED talks on the subject yields a surprising amount of results, as many people have taken interest in how society can harness this growing resource.

Books like Jim Rossignol's *This Gaming Life: Travels in Three Cities*, demonstrate the positive impact of games on modern life while books like Jane McGonigal's *Reality is Broken: Why Games Make us Better and How They Can Change the World* focus on the potential impact of games on society as a whole. Other books focus on making good games. This thesis will utilize two main textbooks on game design: *Rules of Play: Game Design Fundamentals* by Katie Salen and Eric Zimmerman and *Fundamentals of Game Design* by Ernest Adams. Both written by game designers, these books provide the basic framework to create a game without delving into the heavy technical or programming aspects of design. *Rules of Play* deals mostly with the design of game mechanics themselves, namely through the use of rules, play, and culture, but is not bound only to video games. *Fundamentals of Game Design* briefly talks about similar concepts, but focuses on other aspects such as character, environment, and interface design, and the various types of video game types. While there is some overlap between the two, they are distinctly different in the lessons they aim to teach.

1.1 | VIDEO GAMES AND ARCHITECTURE

Video games have also aroused the interest of architects and urban planners. The 2007 book *Space Time Play: Computer Games, Architecture and Urbanism: The Next Level*, edited by Friedrich von Borries, Steffen P. Walz, and Matthias Böttger, is an example of the growing popularity of linking video games to architectural fields. The book itself is a compilation of essays by architects, urban designers, and game designers that explore both the existing and future relationships between video games and architecture. In its introduction, *Space Time Play* posits how video games are changing our ideas of space and time.

> Computer games are part and parcel of our present; both their audiovisual language and the interaction processes associated with them have worked their way into our everyday lives. Yet without space, there is no place at which, in which or even based on which a game can take place. Similarly, the specific space of a game is bred from the act of playing, from the gameplay itself. The digital spaces so often frequented by gamers have changed and are changing our notion of space and time, just as film and television did in the 20th century.[2]

As video games become more ubiquitous in modern culture, architects and urban planners have taken interest as to how their spaces, and the technologies used to generate, them can be both understood and used to assist the field of architecture and design. *Space Time Play* is split into five "levels" which provide a general scope of the current explorations into this growing field of interest. It is important for this introduction to present these levels, as well as other literature on the topic, in order to position this thesis within the general premise of architecture and video games.

The first level of *Space Time Play*, "The Architecture of Computer and Video Games*",* provides an analysis of the existing architecture that has arisen through video games, both in-game and in the spaces they are played in; or "A Short Space-Time History of Interactive Entertainment", as the subtitle implies. The section explores how video games have generated unique virtual spaces, as well as how players interact with these spaces, such as through video game controllers. For example, Alex de Jong from the Office for Metropolitan Architecture (OMA) analyses the architecture of the popular shooter *Counter-Strike* (Figure 1-1):

[2] Borries, Walz and Bottger 2007, 11

> To consider maps of Counter-Strike as architectural artifacts would be like describing a ghost town. The very essence of gaming, interaction, would be missing. The architectural invention of Counter-Strike works in another way. The game provides the connection that makes it possible for someone to move from one space (ruins, pools, castles) into another. Playing Counter-Strike is like moving between spaces that would normally be separated. It offers access to a wide diversity of spaces in which people battle each other. This gets close to the very foundations upon which architecture in our mediated world will have to be based: giving access to environments that are real and virtual at the same time. To do so, architecture will need a theory that combines both architecture's physical and medial aspects.[3]

Figure 1-1: Counter-Strike Source

The next level, "Make Believe Urbanism: The Ludic Construction of the Digital Metropolis", explores the "social cohesion of game-generated spaces"[4] or the creation of communities in video game space. Since the advent of the internet, video games have been quick to adopt its connective possibilities. The current state of connectivity can be best observed in MMORPGs (Massively Multi-player Online Role Playing Games), such as *World of Warcraft* (Figure 1-2) in which millions of players play simultaneously in a virtual world with its own culture,

[3] Jong 2007, 43

[4] Borries, Walz and Bottger 2007, 12

economy, and politics. The essays in this section observe how both game designers and players alike generate and interact with these new urban spaces.

> At the same time, the central topic of this level is the tension between the representation of the city in games and the city as metaphor for the virtual spatialization of social relations. How can sociability across space-time be established, and how will identity be "played out" there? The communities emerging in games, after all, constitute not only parallel cultures and economies, but also previews of the public spaces of the future.[5]

Figure 1-2: A virtual concert in World of Warcraft

The third level, "Ubiquitous Games: Enchanting Places, Buildings, Cities and Landscapes", explores the emerging genre of games that use the real world as the platform for play. It is important to note for the purposes of this thesis that the term "real world" refers to the physical world and its architecture opposed to the digital, virtual spaces of video games. The internet, mobile devices, social networking, and augmented reality devices can now transform physical urban spaces into game spaces. For example, *PacManhattan* was a final project from the Interactive Telecommunications Program at New York University in which a 5x6 block around Washington Square Park was used as a maze

[5] Ibid

for a Pac-Man game, where Pac-Man and the Ghosts were real people in costume (Figure 1-3). By communicating to a "controller" via cell phone, players were able to direct Pac-Man through the maze of streets and alleyways, essentially repurposing the city as a game board. These alternate reality games, or ARGs, have been of great interest to architects and urban designers, as they can enrich the experience of the built environment, as well the lives of the people inhabiting them through play. Furthermore, they present another reality that can exist alongside physical architecture.

Figure 1-3: PacManhattan

The fourth level is entitled "Serious Fun: Utilizing Game Elements for Architectural Design and Urban Planning". As the title implies, this section observes the various examples of how designers are using video games in a constructive manner to assist in the creation of the built world. The diversity of the use of games in real world design is truly exemplified in this section, ranging from city building as a game, to collaborative design using multi-player games, and using virtual reality devices for prototyping spaces. In general, this level demonstrates how designers are using play in conjunction with technology as an instrument for design.

The final level, "Faites vos Jeux: Games Between Utopia and Dystopia", discusses the cultural ramifications of video games, and asks the questions: "Which gamespaces are desirable and which are not? Which ones should we expect? Life as computer-supported game? War as game?"[6] This section looks at the speculative futures of video games and how they could change the way designers will look at world. Video games could present new forms of advertisement, surveillance, even geography and dreaming.

As a whole, *Space Time Play* presents a realistic landscape of this growing topic. The important thing to learn from the book is that, like other architectural discussions, "architecture and video games" is not just a singular notion. There are questions within the discussion that result in a variety of interpretations to the use of architecture in video games, and vice versa. Each essay could serve as a jumping point for independent study and research. This thesis does not propose that architecture and video games is a brand new form of architectural research, but aims to be a contribution to a specific conversation about architectural space and video games.

It is important to note that while *Space Time Play* currently presents the largest published collection of essays on the topic, there are still many other contributions to the discussion from both the past and present. Christopher W. Totten wrote his architectural master's thesis *Architecture and Video Games* in 2008, which explored the notion of using the game design workflow in the creation of real world architecture. He has gone on to write articles for game design sites, such as *Designing Better Levels through Human Survival Instincts* at Gamasutra.com. Kas Oosterhuis, professor of digital design methods at the Delft University of Technology has organized conferences entitled *GameSetMatch* in which contributions to gaming, advanced geometries, and digital technologies are presented in the paradigm of architecture.

[6] Ibid, 13

One of the most recent books on the topic of architecture and games is Steffen P. Walz's *Toward a Ludic Architecture: The Space of Play and Games*. As one of the co-editors of *Space Time Play*, Walz aimed to fill the gap in literature between play and space that was present in *Space Time Play*:

> So far, however, there is no in-depth treatise that aims to architecturally frame play and games as human practices in space and of space, examining the forms in which ludic activities take place. This book attempts to fill this gap in the academic discourse and to work towards a ludic architecture, i.e. a comprehensive and critical discussion of play and games through the lens of architectural paradigms.[7]

As a whole, Walz aims to discover if play can be defined as an architectural category - ludic architecture - and furthermore, what the parameters are that govern ludic architecture. The book has three main units: "Playspace", "Gamespace", and "Play-Grounds: An Archaeology of Ludic Architecture". In "Playspace", Walz defines the dimension of the conceptual space of play in terms of ambiguity, the player, modality, kinetics, enjoyment, and culture. "Gamespace" defines the approaches to space in game design research, such as the magic circle, allegory, contested spaces, etc. It also presents the approaches to games in architectural research, such as the rhetoric of architecture as a game and games for architectural experimentation and visualization. This section concludes with an analysis framework for investigating the spatiality of games that links the dimensions of "Playspace" to "Gamespace". "Play-Grounds" is an inventory of architectural formats that could be considered as spaces that "allow for or embody play activities or even games"[8]. Examples include, but are not limited to, the board, the theater, the map, terrain, and square. As the title of the book implies, Walz does not conclude with a definitive understanding of ludic architecture, but does provide all the necessary parameters towards an architect's analytical understanding of games, play, and architecture.

[7] Walz 2010, 12

[8] Ibid, 133

1.2 | STRUCTURE

This thesis explores the spatial aspects of ludic architecture in video game spaces, but does not try to define ludic architecture. Ludic architecture is a broad term that encompasses all architecture that relates to play and games, such as playgrounds, stadiums, kindergartens, casinos, and amusement parks. In *Toward a Ludic Architecture*, Walz's expands the term into spaces that are not only specifically designed for play, but also spaces that foster or raise the possibility of play, such as cities, malls, and even the body. Furthermore, ludic architecture can also refer to the use of play as a tool for architectural design[9]. As a whole, ludic architecture is architecture as it relates to play and games. This thesis, however, aims understand the specific spatial organizations within the general spatial format of video games. This thesis looks directly at how video games change implied spatial meanings in the magic circle, as well as the unique spatial decisions video game designers use to hold gamers in a state of flow.

This thesis will undertake the analysis of first person and third person shooter games, since both types of games require spaces to be fully realized in three dimensions. This thesis will also examine the spatial requirements of both single-player and multi-player game modes within each genre. Understanding these requirements serves as an extension into the concepts of architectural space in video games by creating parallels with real-world architecture. In single player games, spaces tend to be linear in nature, resembling valleys aimed to accommodate gameplay and narrative by guiding, pacing and challenging the player throughout the game. These linear spaces can be compared to a cathedral, where the linear narrative of liturgy is presented in space. In non-linear single player games, the city is usually used as a basis for exploration in space, providing a network of paths and destinations. In multiplayer games, space is a main factor in allowing players to meet and interact. As a means of understanding multiplayer spaces, this thesis draws comparison to the works of Aldo van Eyck, an architect that focused on the notion of fostering "chance encounters" through the concept of "labyrinthine clarity". Projects like the Amsterdam Orphanage and the Sonsbeek Pavilion are examples of space manipulated with a clear intent for social interaction. These examples serve as spatial allegories to better understand the spaces presented in this thesis for a reader unfamiliar to video games.

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[9] See Harriss, H., "Ludic Architecture: Playful tools for participation in spatial design". *Design Principles and Practices: International Journal Common Ground.* Vol 4, Number 5, 2010: 175-186

The main portion thesis will begin by defining the concepts of the magic circle and flow. Before engaging as to how these concepts affect video game spaces, an exploration into how video games themselves can create magic circles and flow is required. To do this, the two main components of game design, gameplay and narrative, are defined and analyzed. These elements will then be used to understand how the magic circle and flow are created in video games. With a framework as to how effective gameplay and narrative can affect the holding power of games, an analysis into video game architecture can begin.

This thesis aims to understand the importance of space in video games. Space acts as the board or field where a game is played and can become the most memorable part of a game. This thesis will observe how the magic circle is both defined and transformed spatially in video games, namely through the rules set by the game. An example of the magic circle is presented in *Rules of Play* in the form of hide-and-seek.

> Consider a group of kids in a suburban front yard, casually talking and hanging out. They decide to play a game of Hide-and-Seek. One of the kids takes a rock and plants it in the middle of yard to represent home base. The group huddles around it, playing "eenie-meenie-miney-moe" to pick the first person to be "It"; then they scatter and hide as "It" covers his eyes and starts to count to twenty. All at once, the relationships among the players have taken on special meanings. Who is "It" and who is not? Who is hidden and who can be seen? Who is captured and who is free? Who will win the game?[10]

Firstly, this example demonstrates the transformation of players. Before the game, the kids were just kids. Once engaged, one child becomes “it” while the others become hiding children. The fate of these players is now important to them, all because a game is now present. Suddenly the rules of the game have created challenges and objectives that define the current world of the players. Furthermore, these challenges are enforced by rules that are otherwise unimportant in the real world (Figure 1-4). For example, if the “it” were to not cover his eyes, he could simply watch where everyone was going to hide, and “win” almost instantaneously. In a non-game situation, this would be the easiest means of finding someone, by simply following players as they hide. However, given the rules of the game, this condition is met, and the magic circle is maintained.

[10] Salen and Zimmerman 2004, 96

Figure 1-4: Hide-and-Seek

Secondly, the space itself has changed as well. A rock in the yard is now a home base that represents the starting point of the game. Given the rules agreed upon, the boundaries of the game could be the edge of the front yard, fence to fence, but not past the sidewalk. If playing in a park, the space could be how far one can run before a count to twenty ends. In a house, perhaps only the ground floor is in play. Trees, cars, rocks, sheds, tables, and closets are no longer used for their intended purposes as they are now "hiding spot" candidates. Similarly, the front yard, park, and house are now playgrounds. In this case, a game has transformed the meaning of a space due to its rules, and the very act of playing. This is at the core of the magic circle. While Hide-and-Seek provides an example of a game transforming a space not intended for play, the same principles could apply to a space specifically designed for play. Without teams, equipment, and rules, an arena is simply an auditorium. This thesis will observe similar situations created in video games. In FPS and TPS games, the rooftops of a city can become a free running course (Figure 1-5), a cottage can become a fortress against a zombie invasion (Figure 1-6), and a carnival can be a hectic military battleground (Figure 1-7). Individual set pieces, such as parked cars, radio towers, and magazine stands can turn into barriers, valleys, waypoints, and obstructions to sightlines. Within the magic circle of video games, the implied meanings of spatial organizations are transformed by the rules of the game.

Figure 1-5: Mirror's Edge

Figure 1-6: Left 4 Dead

Figure 1-7: Call of Duty: Modern Warfare 2

In his article *The Measurement of Flow in Everyday Life: Toward a Theory of Emergent Motivation*, Csíkszentmihályi identifies the following eight points as the "characteristic dimensions of the flow experience"[11]:

1. *Clear goals:* it is clear what should be done; *Immediate Feedback:* one knows how well one is doing.
2. The opportunities for action are relatively high, and they are met by one's perceived ability to act; *challenges=skills*.
3. *Action and awareness merge*; one-pointedness of mind.
4. *Concentration on the task at hand*; irrelevant stimuli disappear from consciousness, worries and concerns are temporarily eliminated.
5. A sense of potential *control*.
6. *Loss of self-consciousness*, transcendence of ego boundaries, a sense of growth and of being part of some greater entity.
7. *Sense of time altered*; usually time seems to pass faster.
8. *Experience becomes autotelic* – if several of the previous conditions are present, what one does becomes autotelic, or worth doing for its own sake.[12]

[11] Csíkszentmihályi and Rathunde, The Measurement of Flow in Everyday Life: Toward a Theory of Emergent Motivation 1992, 60

[12] ibid

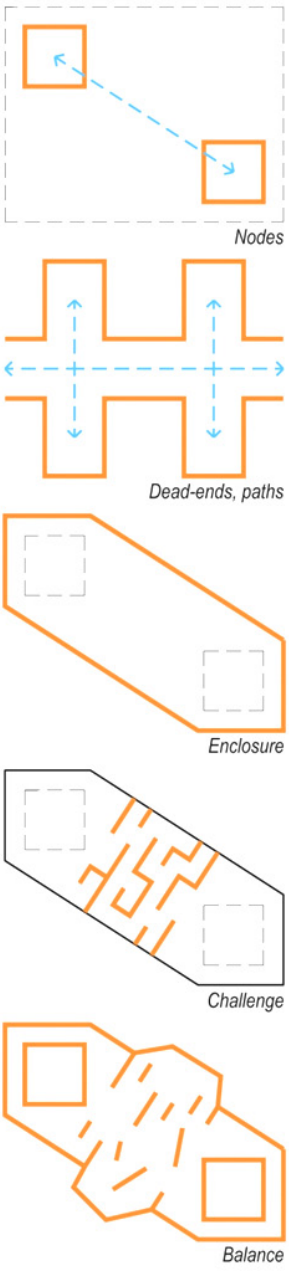

Figure 1-8: Characteristics of video game flow spaces

For the most part, effective video games achieve these characteristics through gameplay and narrative. However this thesis introduces the concept of spatial organizations assisting gameplay and narrative in creating flow in video games. In a similar fashion as the dimensions of flow by Csíkszentmihályi, this thesis suggests its own set of dimensions that contribute to the flow experience, using space in video games:

1. *Spaces have nodes*; clear points in space can guide a player's actions, even in the absence of narrative and gameplay.

2. *Dead-ends, barriers, and paths* can provide immediate feedback for a player's movement through space.

3. *Enclosures* ensure the task is concentrated in a finite amount of space to avoid deviation from the intended gameplay or narrative; and can contribute to the intensity of a game.

4. *Challenge* can be generated by space given the ability or limitations of the player's avatar. Some examples include, but are not limited to, obstacles, visual baffles, and environmental puzzles.

5. Challenge can be *balanced* by a thoughtful implementation and organization of these devices into spatial modes.

6. If several of these dimensions are effectively implemented, space assists gameplay and narrative to form an *autotelic experience*.

Consider the game Hide-and-Seek again. Space plays a direct role in the enjoyment and flow of the game. Why is a front yard better for the game than an open field or a dense forest? Firstly, the yard has clear nodes. A tree, a rock, the driveway or the porch all provide points of destination, reference, and safety. Secondly, the yard's dead ends and paths provide instant feedback to "it" as to where to move. Third, the game may be limited to the yard, which is bound by the road, the neighbouring fences, and the facade of the house. This ensures that the game is limited in its scope, as to not distract from the current game objectives. If the game included the entire neighbourhood, the opportunities for remaining hidden would be too great, and the chances of finding players would be too little. Fourth, the hiding spaces within the enclosure are not especially easy to hide behind, nor are they too easy for "it" to discover. Fifth, the space is balanced in its amount of hiding places with both open and dense areas, providing an opportunity for both the hiders and "it" to succeed. Lastly, the space itself becomes part of the game, and makes the game worth playing.

In contrast, a field would prove too difficult for one to hide and the game would soon lose its appeal as "it" begins to point out children lying down on the grass. Similarly a dense forest would prove to be too difficult for "it" to find children hiding in trees and underbrush. In both these situations, the skills of the players could make the game enjoyable; for example, if the children on the field were expert camouflage artists, while the forest "it" could be a seasoned tracker. However, given an average situation, it is the space that supports the flow of Hide-and-Seek and in both situations the game becomes too easy or too hard for either party. In these cases, the space becomes a hindrance that breaks the possibility of flow. Similarly, in video games, space can play an essential role in the creation of enjoyable play experiences. While Hide-and-Seek utilizes existing physical spaces, FPS and TPS games have the opportunity to either fully design or modify conceptual spaces to assist in the creation of flow.

After elaborating on the spatial characteristics of flow in video games, this thesis will examine the effects of the magic circle and the design of flow in a series of video game case studies. These include the narrative spaces of *Half-Life 2*, a frantic action map from *Call of Duty: Black Ops*, the urban landscape of *Assassin's Creed*, and the impossible spaces of *Portal*. Each case study exemplifies a unique spatial design based on the needs of the gameplay and/or narrative of the game.

This thesis culminates in the design of a video map using a pre-designed gameplay mechanic (Figure 1-12). The design will demonstrate the transformation of space within the magic circle through games rules, and using the observed dimensions of flow, create a space that assists in the creation of a state of flow. The design will use the University of Waterloo School of Architecture (UWSA) as a basis for the creation of a multi-player Capture the Flag (CTF) map using the *Unreal Development Kit* (UDK). Through the rules of CTF, the UWSA will be changed from a space of education and gathering into intense space of competition. The studio will become maze of combat, while the atrium becomes a well of acrobatic strategy (Figure 1-9).

While the existing space itself can accommodate CTF gameplay, the UWSA will require some modification to ensure that challenge is balanced by space in order to create flow and enjoyment in general (Figure 1-11). The main modification to the UWSA will be to reduce its enclosure to ensure a higher density of chance encounters, centered about the main atrium space. Further manipulation of the enclosure will generate two main nodes that feed into the atrium, creating a bipolar organization that accommodates the nature of a CTF game. Further modifications include the opening of paths for a greater flow of circulation in some places, and an implementation of barriers and obstacles in others, to both guide and challenge players into a state of flow. The main goal of this synthesis is to generate flow using mainly spatial modifications (rather than gameplay and narrative decisions), while demonstrating the concept of the magic circle through the use of the UWSA.

Figure 1-9: UWSA atrium

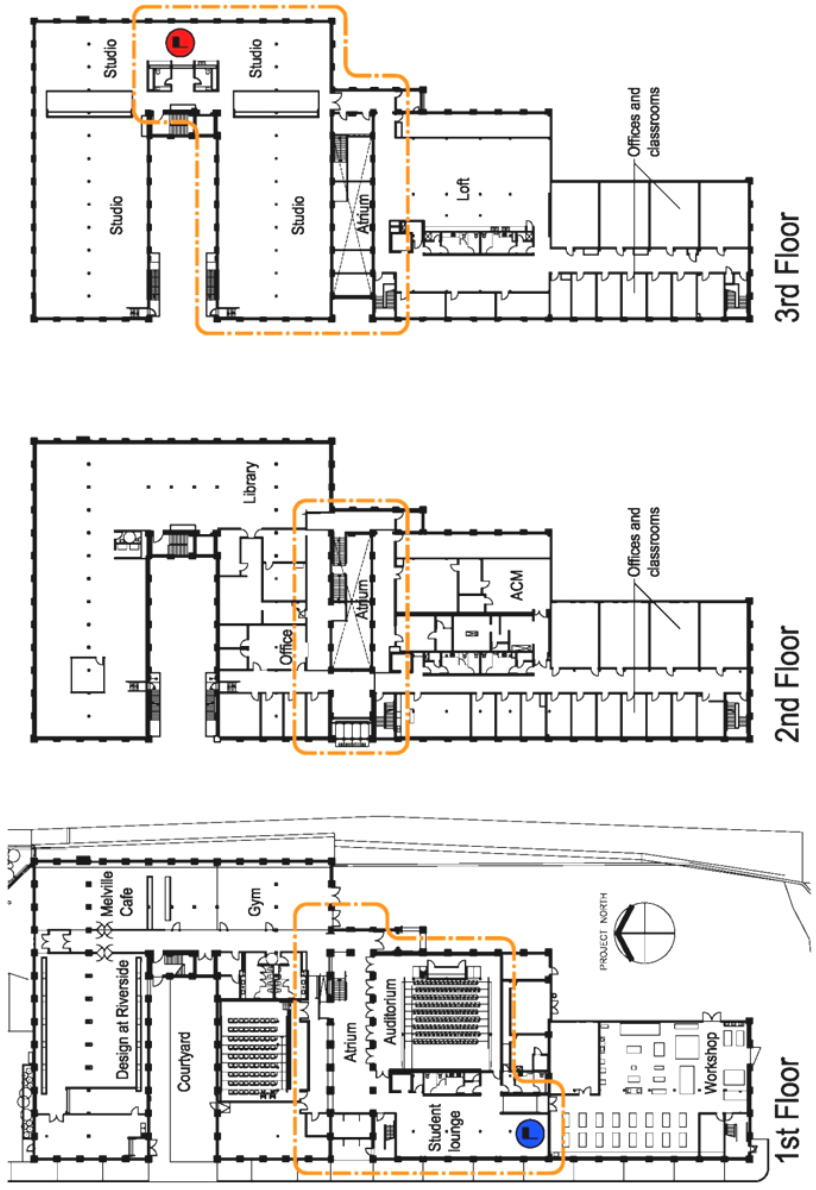

Figure 1-10: UWSA plans with enclosure noted, N.T.S.

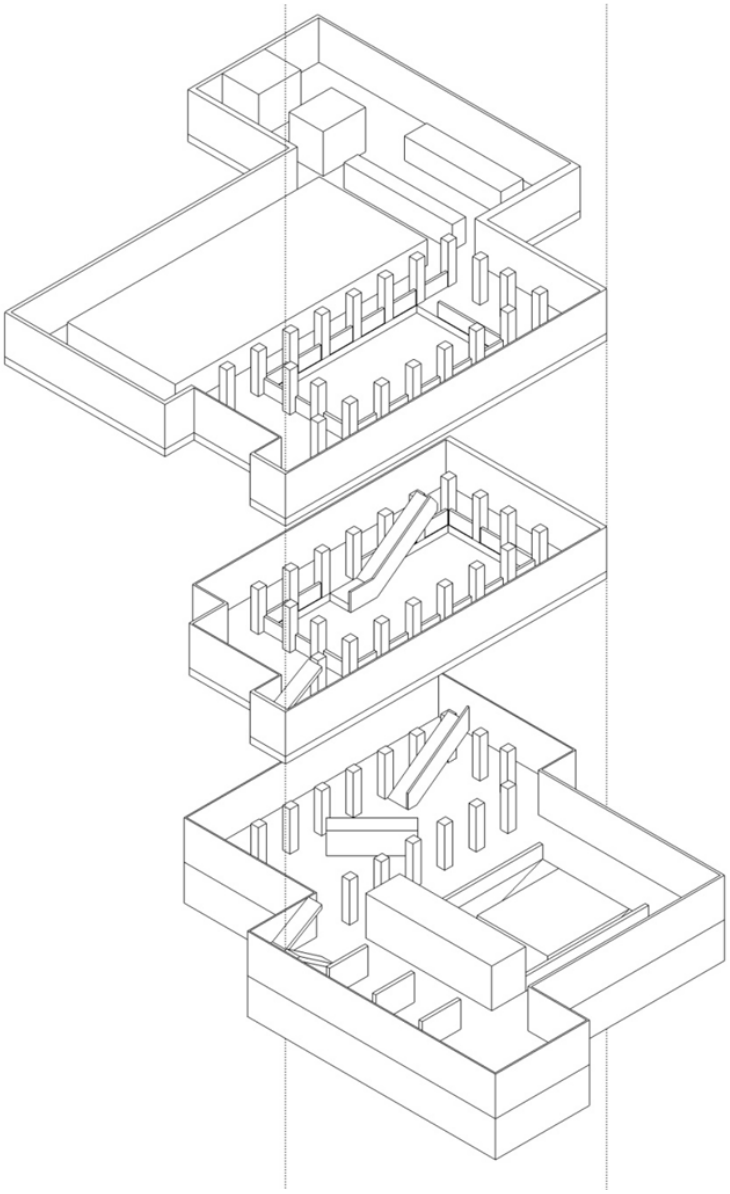

Figure 1-11: Design synthesis modification overview

Figure 1-12: Design synthesis screenshot

This thesis as a whole attempts to understand how space is specifically designed to create of gripping experiences in video games. Game designers create virtual worlds that bring countless hours of joy and entertainment to players around the world. While they are easy to dismiss as time wasters and distractions, video games, especially FPS and TPS games are actually concise spatial designs that demonstrate how space is both transformed by the rules of play, and how the specific design of these spaces contributes to the creation of an enjoyable state of flow for players. This thesis aims to shed light on the rigorous spaces created by game designers for architects to observe.

As more and more people grow up with video games as a part of their lives, the spaces and environments within them become part of their spatial lexicon[13]. As architects in the age of video games, it is important to understand how they are designed, as well as their merit as viable spaces for architectural design. Architects should understand the unique properties of video games that set them apart from other architectural practices; just as urban design differs from building construction. This thesis attempts to introduce the distinct spatial qualities of video games environments that allow them to be an architectural category, and well as how these spatial qualities entertain players in their own right.

[13] See *Mapstalgia* (www.mapstalgia.tumblr.com), a blog by Josh Millard, where the public submits images of "video game maps drawn from memory".

1.3 | NOTE ON MATERIAL CHOICES

The video game industry is an ever changing industry that sees no signs of stopping soon. Due to this constant growth and innovation within the video game industry, the examples and references in this thesis may become, or already are obsolete. The choice of examples and case studies in this thesis were chosen for both their timeless innovation and popularity at the time of this writing. Furthermore, due to the experiential qualities of video games, many of the games chosen for discussion are games that have been played by the author. There are many other games that could provide equally relevant material, and choices are due to the personal experience gained by playing. Furthermore, the video games now encompass broad spectrum of platforms including personal computers, consoles, arcades, and mobile devices. For the most part, this thesis focuses on the contributions to computer and console gaming, again, due to the experiences of the author.

All screenshots and diagrams of games are either the author's own, official screenshots from the developer, or from the game distribution platform *Steam*, unless otherwise noted.

2 | VIOLENCE AND VIDEO GAMES

It is inevitable that in the discussion of video games, especially in the FPS and TPS genres, that the issue of violence in video games and other controversy arises. There is no denying that many, if not all, FPS and TPS games are based on violent acts and rely on them in their gameplay and narrative. Since the advent of violence in video games there has been controversy as to whether or not it has been linked to real world aggression in players, especially in teens and adolescents. The subject is itself a large area of study for a variety of professionals, including psychologists, lawyers, politicians, and game designers themselves. This thesis aims to take a sensitive approach towards the existence of violence in video games, and does not intend to glorify the violence present in the games presented in any way shape or form. This thesis observes the gameplay and narrative present in these games in order to understand the spatial qualities of video games. If FPS and TPS games did not feature violence and presented unique play spaces, this thesis would still exist. The author of this thesis is in no way an expert on the topic of video game controversy and would like to point to the following references:

- *Game Over: Gender, Race & Violence in Video Games*, (film), directed by Nina Huntemann.
- *Grand Theft Childhood: The Surprising Truth about Violent Video Games and What Parents Can Do,* by Lawrence Kutner, Ph.D. and Cheryl K. Olson, Sc.D.
- *Killing Monsters: Why Children Need Fantasy, Super Heroes, and Make-Believe Violence,* by Gerard Jones
- *Testimony Before the U.S. Senate Commerce Committee, May 4, 1999*, by Henry Jenkins, Ph.D., Director of the Comparative Media Studies Program and a Professor of Literature at the Massachusetts Institute of Technology.
- *Violent Video Game Effects on Children and Adolescents,* by Craig A. Anderson, Douglas A. Gentile, and Katherine E. Buckley.
- *Violent Video Games: Myths, Facts, and Unanswered Questions,* by Craig A. Anderson, PhD., American Psychological Association

3 | PLAY AND GAMES

Before this thesis goes more in depth into the topics of play and games. It is important that a consistent description of both is set. While there are many definitions for both, this thesis will utilize the definitions presented in *Rules of Play*, as they are defined from the perspective of a game designer.

> Play is free movement within a more rigid structure.[14]
>
> The words play and games have a unique relationship in the English language. There are two ways to frame their relationship, both of which are useful:
>
> - Games are a subset of play: The category of play represents many kinds of playful activities. Some of these activities are games, but many of them are not. In this sense, games are contained within play.
> - Play is a subset of games: Games are complex phenomena and there are many ways to frame them and understand them. RULES, PLAY, and CULTURE are three aspects of the phenomena of games. In this sense, play is contained within games.
>
> A game is a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome. The key elements of this definition are the fact that a game is a system, players interact with the system, a game is an instance of conflict, the conflict in games is artificial, rules limit player behavior and define the game, and every game has a quantifiable outcome or goal.
>
> A puzzle is a special kind of game in which there is a single correct answer or set of correct answers. All puzzles are games.[15]

[14] Salen and Zimmerman 2004, 304

[15] ibid 311

Video games are unique digital games, but are still no different than games in the physical medium. *Rules of Play* puts emphasis on the fact that the digital aspect of video games should not be the focus:

> If a game is framed as a system, it is clear that the game's physical medium is an important element of the game, but does not constitute the entire system. Digital technology should not be emphasized as an end in itself, but instead should be understood as one element in a larger designed system.
>
> There are four traits that summarize the special qualities of digital games. These traits are also present in non-digital games, but digital games generally embody them more robustly:
>
> Trait 1: Immediate but narrow interactivity
>
> Trait 2: Manipulation of information
>
> Trait 3: Automated complex systems
>
> Trait 4: Networked communication
>
> The underlying properties of games and the core challenges of game design hold true regardless of the medium in which a game manifests. [16]

Thus, it is important to understand in this thesis that video games are merely another medium of games that expands upon the possibilities of physical games. *Fundamentals of Game Design* adds to the definition of a game:

> A game is a type of play activity, conducted in the context of a pretended reality, in which participant(s) try to achieve at least one arbitrary, non trivial goal by acting in accordance to the rules. [17]

In this definition, the aspect of a pretended reality is brought to light, which will later surface through the concept of the magic circle. The concept of play and games is a complex one that a variety of fields have explored. This thesis uses these definitions as they are defined by game designers.

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[16] Salen and Zimmerman 2004, 91

[17] Adams 2010

4 | VIDEO GAMES

The term video game is a broad one. Just as the word “game” could mean a puzzle, board game, card game, or sport; a video game could mean a real-time strategy game, role playing game, fighting game, simulator, or point-and-click adventure. This thesis and its case studies will focus on the specific genres of first and third person shooters as they provide the most immersive means of exploring and designing architecture in virtual space. This thesis will also investigate both single-player and multi-player modes within these genres. This section introduces a brief history and explanation of first and third person shooters, as well as the differences between single-player and multi-player games. It also introduces the concept of the differences in space between the two modes, as a means of entry into the discussion of architecture.

Although this thesis will try to describe games as thoroughly as possible, it is impossible to truly describe the experience of video games. To fully understand the phenomena of video games, one must play a video game. Even watching someone play a video game is not enough, since video games are uniquely interactive. Much like a building, viewing plans, sections, and even photographs can only go so far when describing the qualities of a space.

> Capturing what playing *Left 4 Dead* feels like is not easy. But set *Left 4 Dead* to its highest difficulty level, recruit three of its best players you can find, push your way through one of the game's four scenarios, and make no mistake: What will go down will be so emotionally grueling, it will feel as though you have spent an hour playing something like full-contact psychic football. The end of the game, however it turns out, will feel epic to no one who did not take part in it, but those who did take part will feel as though they have marched, together, through a gauntlet of the damned.[18]

[18] Bissel 2010, Chapter 3

4.1 | FIRST PERSON AND THIRD PERSON SHOOTER

Figure 4-1: First person action in Halo: Reach

> 3D shootings games such as those in the *Halo* and *Half-Life* series have become so successful that to a great many younger gamers they are the epitome of the entire medium.[19]

A first-person shooter, or FPS, is a game that is viewed in the first person perspective, through the avatar's eyes (Figure 4-1). When using a computer, players have the ability to transverse 3D modeled environments, using the keyboard's WASD keys to move horizontally and using the mouse to look around the environment. Similarly, on video game consoles such as the Xbox or Playstation, players use the direction arrows and thumb stick on a handheld controller for movement and viewing. The buttons on a mouse and trigger buttons on a controller are used as action buttons, such as shooting or interacting with the environment. Other buttons such as space, shift, or C may control jumping, running, and crouching.

FPS gameplay primarily consists of gun or melee combat, where players must complete objectives while defeating enemies that stand in the way. Third-person shooters or TPS are almost identical to FPS games, but with a third person perspective, as in the player is able to see their character from behind (Figure 4-2). These games sometimes involve more movement based objectives, such as jumping and climbing, known as platforming. TPS lend themselves to platforming due to the greater field of view created by the third person perspective.

[19] Adams 2010, 395

This thesis focuses on these two genres of video games because they provide the most immersive perspectives within a virtual environment when it comes to video games. Other games such as real time strategies and role playing games offer fantastic environments as well, but usually have their cameras locked in an isometric view. In Cartesian terms, FPS and TPS allow for movement in all axes, while other games are limited to two given the complexity of their gameplay. Next to donning a 3D virtual reality helmet, playing an FPS or TPS is the closest thing to walking through a virtual space. In an architectural sense, other games present themselves as plan (top down shooters), section (side scrollers), and axonometric (strategy and role-playing-games) drawings, while FPS and TPS genre are closer to physical model or even a physical walkthrough.

Figure 4-2: Third person fighting in Batman: Arkham City

It is difficult to say when first FPS or TPS was created, as video game history and resources are still in flux due to being such a new medium. However, it is fair to say that the first commercially successful, mainstream FPS was *Wolfenstein 3D*, released in 1992 by id Software for MS-DOS. Playing as Allied spy William "B.J." Blazkowicz, the player fought through a World War II era castle riddled with experimental Nazi created monsters. Using ray casting technology, *Wolfenstein 3D* defined what an FPS is, and is still considered as template for the modern FPS. The player begins with a basic set of weapons, a knife and a pistol, and kills enemies in order to acquire stronger weapons and to advance to the set stage. The end of a stage usually consists of a “boss” battle, where the player faces off against a more difficult foe. The player picks up ammo and health in order to survive these levels. Visually, the game is viewed through a heads-up display, or HUD, which displays vital information such as health, ammo, lives, score and floor/level as

text (Figure 4-3). The frame of view also includes the character's hands and whatever weapon they are holding. The fast paced action and top of the line graphics of the time made *Wolfenstein 3D* push video games into a new age of immersion.

Figure 4-3: Wolfenstein 3D

Similarly, *Tomb Raider*, developed by Core Design and published by Eidos Interactive in 1996, is seen as the first mainstream TPS. First developed for the Sega Saturn, then released for MS-DOS and the Sony Playstation, *Tomb Raider* followed the adventures archaeologist Lara Croft as she travelled the world defeating wild animals and human competition in the way of collecting artifacts. The gameplay of *Tomb Raider*, and many other TPS games to follow, differed from FPS gameplay as the focus was less on shooting enemies, but more to do with the movement and interaction with the environment. The third-person perspective which was either behind Lara or over her shoulder allowed for a better grasp of the player's surroundings, and made moves such as jumping, climbing, and ledge grabbing easier to accomplish (Figure 4-4). As such, the gameplay objectives emphasized environmental puzzles, such as avoiding and disarming traps. At the time, this level of movement had only been seen in 2D platform games, and in conjunction with state of the art graphics and a cinematic narrative, made Tomb Raider one of the top-selling games of its era.

Figure 4-4: Tomb Raider

Both these games could be seen as milestones in video game history as they changed the way players could interact with and view a virtual environment. In terms of gameplay, they did not present anything new. Games before Wolfenstein 3D and Tomb Raider already featured shooting and jumping, making the player moving from point A to point B in order to finish a level. These games were special because they were the first instances of players becoming immersed in the 3D environments they were playing in, rather than in the quest for the highest score.

Within the last ten years, the first and third person perspective in games has moved beyond just the shooter genre. As graphics technology advanced and game engines became more versatile, these perspectives have moved into racing, sports, fighting, role-playing, and adventure games. The scale and detail of these games have increased exponentially, reaching Hollywood blockbuster levels of writing and production values. FPS and TPS games have now become the benchmarks of real-time graphics technology. Players can live through adventures in virtual space, able to explore and appreciate the spaces and stories created by game designers. In both genres, the environment plays an immediate role in the success of creating the magic circle and flow. Due to the nature of their perspective views, spaces in FPS and TPS games must be designed and fully realized in three dimensions.[20]

[20] For more information on the representation of space in other video game genres, please refer to *Allegories of Space: The Question of Spatiality in Computer Games* by Aspen Aarseth, 2000.

Figure 4-5: Wolfenstein (2009 sequel)

Figure 4-6: Tomb Raider (2012 Reboot)

4.2 | SINGLE-PLAYER AND MULTI-PLAYER

It is important to note two overall modes of modern video games, especially in the realm of FPS and TPS games, and how these modes affect their designs.

Figure 4-7: Half-Life 2: Episode One, single-player mission

A single-player game is a game played by one player, without the aid or interference of other players via the internet or another controller. Single-player mode usually involves a fairly linear narrative that the player experiences by themselves. Opponents and allies alike are controlled by artificial intelligence, and events in the game are scripted. Single-player modes of games such as *Half-Life 2* (Figure 4-7) and *Halo* usually involve the player as a hero fighting through waves of enemies, while encountering environmental puzzles (such as locked doors) that obstruct the player from reaching their objective, usually saving the world.

Multi-player games consist of at least two players, sharing the game experience through the internet, a LAN connection, or on the same platform using multiple controllers and a split screen. Like real-life sport, multi-player games can be played cooperatively (co-op) or competitively. An example of co-op would be two players working together to defeat swarms AI enemies, such as the *Left 4 Dead* franchise by Valve, where a team of four "survivors" must battle through hordes of zombies to reach designated safe houses (Figure 4-8). In these situations, a lose narrative is still present.

Figure 4-8: Left 4 Dead 2, a multi-player co-op game

Competitive multi-player is an increasingly popularity aspect of video gaming where individuals or teams oppose each other to reach an objective. The most basic form of this would be deathmatch. Deathmatch consists of individuals on a map trying to rack up points by killing, or "fragging" other players on the map. The game session ends when a "frag limit" is reached, or a designated time limit expires. The player with the most frags is deemed the winner of the round. Team deathmatch follows the same logic, but with two opposing teams. Individuals within each team must work cooperatively to increase the frag count. Variations to this gameplay include capture the flag, last man standing, or domination, where players compete to control points of interest. In all these modes, the main objective is still to find other people and eliminate them, either for that sole purpose, or to prevent them from completing an objective. Competitive multi-player is almost always devoid of narrative.

Figure 4-9: Call of Duty: Modern Warfare 2, multi-player

Many games offer all three modes in a single game, while other games are purely single-player or multi-player games. Infinity *Ward's Call of Duty: Modern Warfare 2* is a game that provides an example of single-player, co-op multi-player, and competitive multi-player in one game. The single-player "campaign" features a narrative where the player travels the world, containing various terrorist and military threats. The co-op, called "Spec-Ops", takes portions of the campaign and allows for two players over the internet or local connection to work together to complete objectives, such as defending a control point from waves of attackers. The competitive multi-player features a variety of gameplay modes that incorporates a leveling system, where more frags equal better weapons and upgrades. It has created a large online community with friends banding together to create "clans" that play together regularly. The multi-player maps use similar locales and character models from the single-player game, but offer little narrative other than "Eliminate Enemy Team" (Figure 4-9).

The distinction between the two modes is important to observe due to the differences in spatial design needed to accommodate gameplay and narrative experiences. Single-player and most co-op games are scripted. This means that every move the player makes and every situation they encounter has been planned to occur in a specific way. Enemies spawning at preordained points on the map, friendly non-player characters (NPCs) interacting with the player at points of rest, and epic events like a building being destroyed are all planned by the game designers to occur at an exact point in space and time. Thus, the spaces of single-player games are designed specifically to suit the needs of the story and gameplay. In single-player games, space can both challenge and guide the player through space.

In some cases, such as *Half-Life 2*, single-player spaces act as linear funnels or valleys that guide the player through a specific path towards the end of the game. Again, scripted events such as an ambush or the blocking of a road provide the action and interaction in the game experience. The spatial organization of these map acts as paths that lead the player to each of these events (Figure 4-10).

An architectural precedent for these spaces could be the church, namely the cathedral. In his architectural thesis, *On the Border: An Architectural Inquiry into the Sacred and Quotidian*, Michael Nicholas-Schmidt describes the spatial organization of Toronto's St. Basil's Church's as a linear path of narrative (Figure 4-11):

> The main sanctuary is placed in the inbetween on a strong vector. The community gathers on a journey towards a projected future in the cross and tabernacle which are placed at the end of the vertex. These elements suggest a destination beyond. Time is modeled as a linear progression towards an eventual sacred time. The architectonic structure models a theological interpretation of time - our time as an inbetween after the fall and before the second coming.[21]

In many cases, the spatial format of the church supports the narrative of the liturgy. It is a linear space that works in conjunction with the existing narrative to create a more meaningful experience. Its organization presents a journey with a beginning and an end.

[21] Nicholas-Schmidt 2009

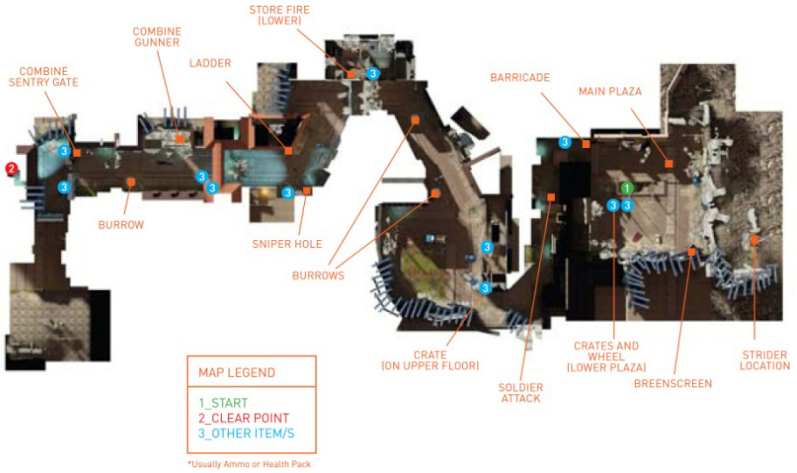

Figure 4-10: Half-Life 2: Episode One map, "Urban Flight"

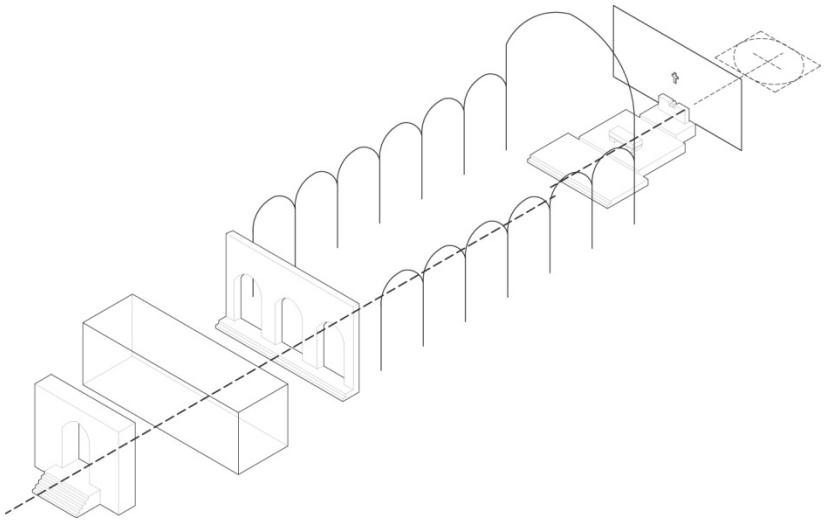

Figure 4-11: St. Basil's church, by Michael Nicholas-Schmidt

In non-linear single-player games, such as the *Grand Theft Auto* series, spaces can be sprawling and interconnected (Figure 4-12) but rely more heavily on gameplay and narrative. In these situations, the spaces still act as support for the scripted events of the game. The paths are simply non-linear towards the objectives in space. Larger, non-linear games tend to use the city as a basis, as it provides a pre-established structure for multiple paths and destinations.

Figure 4-12: Grand Theft Auto IV, map of Liberty City

Figure 4-13: Manhattan, Google Maps

In both cases, the spaces of single-player games act as the board on which the game is played. They support the gameplay and narrative, and can range in scale based on the needs of both. For the most part, their purpose is to limit the movement of the player within the confines of the scripted events of the game.

Multi-player games, especially competitive ones, are non-scripted. Unlike single-player and coop games, all the other characters in the game, enemies and teammates alike, are real people from around the world. This means that all the victories, defeats, conversations, explosions, and mayhem are all generated by individuals contributing to an event. As such, there is a limit to what the game designer can do to script the actions of the players, other than balancing gameplay attributes and the design of the space they play in. The spaces in multi-player games need to promote as much social interaction as possible (even if this interaction involves shooting at one another) in order for the most fun to be had. If players never meet, nothing happens in a game. Thus, multi-player maps must foster as many chance encounters as possible.

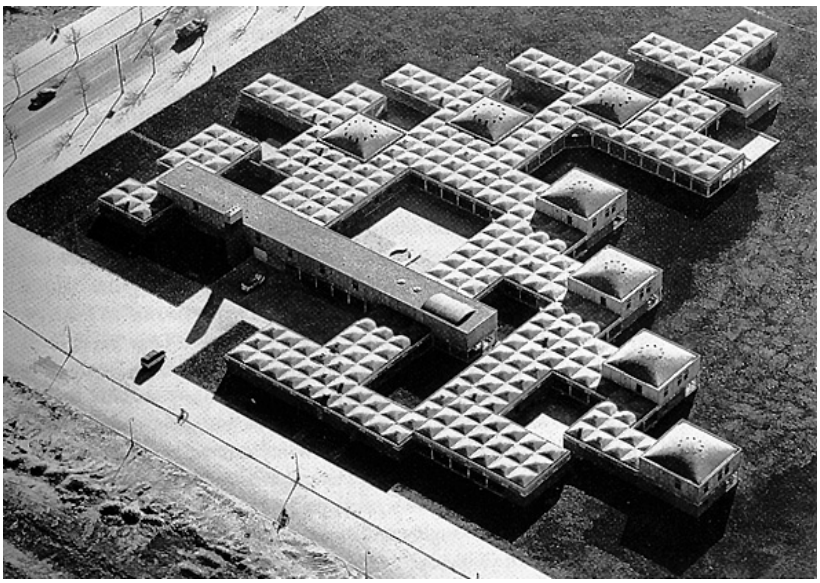

Figure 4-14: The Municipal Orphanage, Amsterdam, aerial

Proponents of chance encounters in architecture were members of the 1950s architectural group Team 10; especially Dutch architect Aldo van Eyck. Many of his projects were designed to promote chance encounters through the concept of “labyrinth clarity”.

> …Aldo van Eyck proposed that architects plan buildings and cities of "labyrinthine clarity," substituting a strict hierarchy of spaces with a more multifarious order. Labyrinthine clarity would thus grant the individual user of the building or city a relative freedom of choice in the use and discovery of its spaces and places.
>
> It was an approach exemplified by van Eyck's Amsterdam Children's Home, designed in 1955 and built between 1958 and 1960, its spaces clustering and crisscrossing like a carpet, punctuated by surprise forms and surfaces like colors and mirrors, and generating adventures and chance encounters among the child internees.[22]

Although the Amsterdam Children's Home (also called the Municipal Orphanage) suffered varying criticism regarding its functionality[23], van Eyck's intention was to create a city within the orphanage that allowed for children of all age groups to meet and interact (Figure 4-14). As requested by the client, the Orphanage does not rely on corridors between rooms, but interconnected spaces that open internally onto one another.[24]

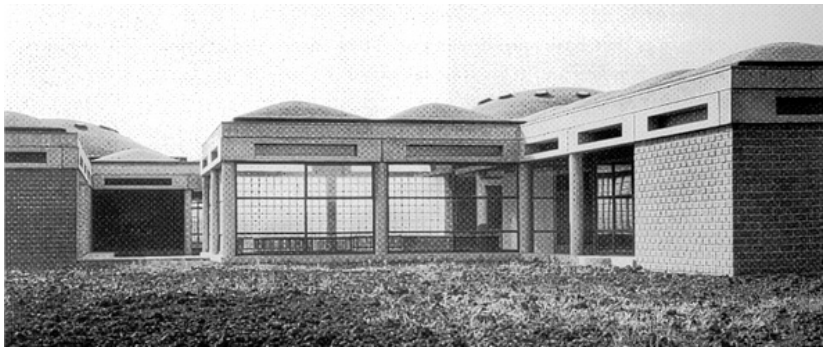

Figure 4-15: Unit for 2-4 age group

[22] Sadler 1998, 30

[23] Strauven 1998, 320-325

[24] Strauven 1998, 285-287

Figure 4-16: Patio of the unit for 2-4 age group

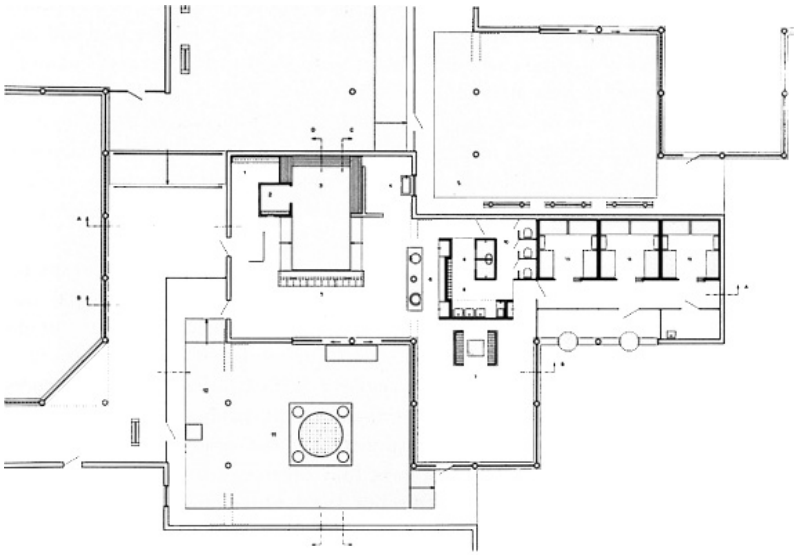

Figure 4-17: Plan of ground-floor units for juniors

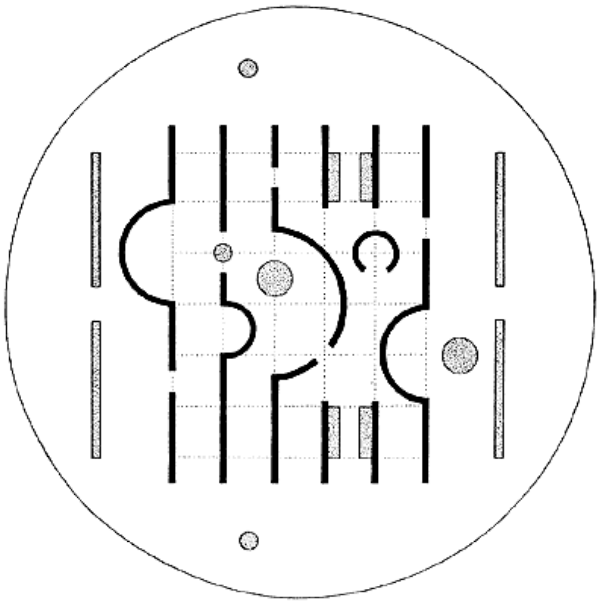

Figure 4-18: The Sonsbeek Pavilion, Arnhem, plan

Another project by van Eyck, the Sonsbeek Pavilion is another example in the design of chance encounters, and perhaps in its purest form. Consisting of parallel walls with open doorways and curved niches, the van Eyck designed the Sonsbeek for visitors to be surprised by both the discovery of sculptures and other visitors (Figure 4-19):

> The clever thing about these passages and lines of sight that cross the building in all directions, is that you keep coming across the same sculpture from different directions. When the arrangement of an exhibition is all too orderly, you're inclined to pass by a piece that at first glance looks unattractive. In Van Eyck's pavilion, you almost stumble into the sculpture – you come across a piece you originally ignored but it captures your attention after all when you approach it from a different angle.[25]

In the same fashion, multi-player maps are designed to anticipate the chance encounters between players. Boundaries funnel players into inevitable bottlenecks or arenas, while varying sight lines allow for surprising meetings with other players.

[25] Röling 1966

Figure 4-19: Sonsbeek Pavilion (2006 reconstruction), photo by Jan-Richard Kikkert

The *Call of Duty: Modern Warfare 2* multi-player map "Terminal" shares similarities with both the Sonsbeek Pavilion and the Orphanage, utilizing staggered obstacles to limit visibility, while creating intersection volumes that promote circulation (Figure 4-20).

Figure 4-20: Call of Duty: Modern Warfare 2 map plan, "Terminal"

Figure 4-21: Call of Duty: Modern Warfare 2, "Terminal"

Successful single-player, coop, and multi-player games[26] all provide meaningful play that immerses the player in the game world with the assistance of spatial design. In further chapters, this thesis will observe the specific modes that allow for space to contribute to enjoyable game experiences.

[26] While many MMORPGs (Massively Multi-player Online Role Playing Games), such as *World of Warcraft*, are another immensely popular mode/genre of TPS and FPS games, this thesis does not discuss them, as they rely more heavily on gameplay and narrative than typical shooters. This is not to say they are not worthy for discussion; in fact the topic of MMORPG architecture is a thesis on its own. See:

Gertzbein, Eric Jarost. "*The Architecture of Space and Transformation in Massively Multiplayer Online Role-Playing Games.*" M.Arch Thesis, University of Waterloo, 2008. UWSpace (http://hdl.handle.net/10012/3781)

5 | THE MAGIC CIRCLE

> Play is older than culture, for culture, however inadequately defined, always presupposes human society, and animals have not waited for man to teach them their playing.[27]

Video games are for play and entertainment. Those who don't play video games could easily dismiss them as juvenile and irrelevant due to the fact that they games. However, games and play are an important aspect of human culture and have shaped much of human civilization. In anthropology, there are many names for the human species. Homo faber is the working man, one that controls their environment with tools. Homo necans, man the killer, is aggressive and based on the hunting ritual. Homo economicus, the economic human, opposes Homo reciprocans, the reciprocal human. All of these names are valid descriptors of the human race, as they each describe a specific aspect of human nature and character.

In 1938 Dutch historian, cultural theorist, and professor Johan Huizinga wrote *Homo Ludens*, or man the player, a book that explores the phenomenon of play in human nature. Huizinga posits that all aspects of human character resembles play, from art to war, and that play in fact is a serious matter.

> In play there is something 'at play' which transcends the immediate needs of life and imparts meaning to the action. All play means something.[28]

Video games are made by and for homo ludens. Game designers find play in the most serious of situations, from human survival to war. Killing a person can become a mechanic for a player to advance through a level. In most games, things that may be considered dangerous merely become obstacles or challenges in the way of winning. Other situations that may seem mundane, such as the crafting and cooking actions in role-playing games, are also turned into viable gameplay mechanics. In a way, game designers are the greatest supporters of Huizinga's theories as they are able to find play in all aspects of life.

[27] Huizinga 1970 1

[28] Ibid

In *Rules of Play*, Salen and Zimmerman devote an entire chapter to the concept of "Meaningful Play". Analyzing the previous quote from Huizinga against the modern concepts of play, Salen and Zimmerman develop two definitions of meaningful play:

> Meaningful play in a game emerges from the relationship between player action and system outcome; it is the process by which a player takes action within the designed system of a game and the system responds to the action. The meaning of an action in a game resides in the relationship between action and outcome.
>
> Meaningful play occurs when the relationships between actions and outcomes in a game are both discernable and integrated into the larger context of the game. Creating meaningful play is the goal of successful game design. [29]

The first definition is a descriptive one that addresses the mechanism by which all games create meaning through play. The second is evaluative, as it helps us understand why some games provide more meaningful play than others. Within this definition are two terms: discernable and integrated. Discernability means that a player can perceive the immediate outcome of an action, while integration implies that the outcome of an action is woven into the game system as a whole.

> Meaningful play engages several aspects of a game simultaneously, giving rise to layers of meaning that accumulate and shape player experience. Meaningful play can occur on the formal, mathematically strategic level of a single move in Chess. It can occur on a social level, as two players use the game as a forum for meaningful communication. And it can occur on larger stages of culture as well, where championship Chess matches can be used as occasions for Cold War political propaganda, or in contemporary philosophical debates about the relative powers of the human mind and artificial intelligence. [30]

[29] Salen and Zimmerman 200434

[30] Ibid, 36

Salen and Zimmerman support Huizinga's assumption that play can be meaningful, and in fact, that meaningful play is important. In *Homo Ludens*, Huizinga suggests that meaningful play exists in a defined space, or play-ground that set them apart from the "ordinary world".

> All play moves and has its being within a play-ground marked off beforehand either materially or ideally, deliberately or as a matter of course … This arena, the card-table, the magic circle, the temple, the stage, the screen, the tennis court, the court of justice, etc., are all in form and function play-grounds, i.e. forbidden spots, isolated, hedged round, hallowed, within which special rules obtain. All are temporary worlds within the ordinary world, dedicated to the performance of an act apart.[31]

As a general term amongst game designers, the term "magic circle" has been used "as shorthand for the idea of a special place in time and space created by a game."[32] In *Rules of Play*, the authors put much emphasis as to how the magic circle affects both play and the space where play occurs.

> Within the magic circle, special meanings accrue and cluster around objects and behaviors. In effect, a new reality is created, defined by the rules of the game and inhabited by its players. Before a game of Chutes and Ladders starts, it's just a board, some plastic pieces, and a die. But once the game begins, everything changes. Suddenly, the materials represent something quite specific. This plastic token is you. These rules tell you how to roll the die and move. Suddenly, it matters very much which plastic token reaches the end first.[33]

Within the magic circle, the rules and objectives of the game change the conventions and concepts of social etiquette, interaction, and space. On a crowded bus it is a polite and kind gesture for a passenger to give their seat up for a standing passenger. In a game of "musical chairs", players are encouraged to push others out of the way to sit in a chair at the end of the song. In the magic circle, rules make actions and strategies that would be considered mundane, rude, or devious, acceptable and fun (Figure 5-1).

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[31] Huizinga 1970

[32] Salen and Zimmerman 2004, 97

[33] Ibid. 96

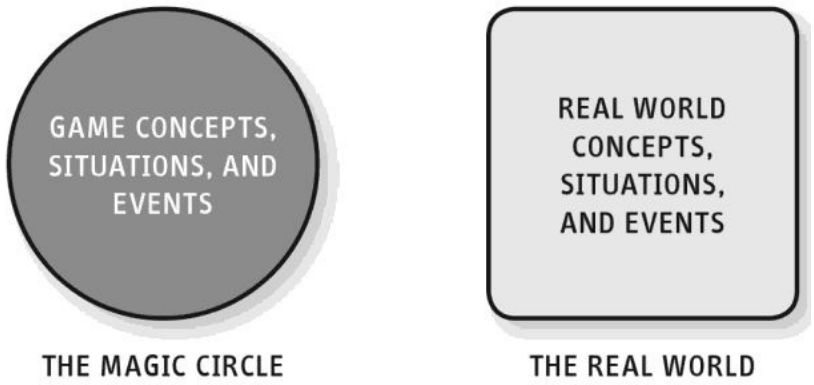

Figure 5-1: Magic circle diagram from Fundamentals of Game Design

In video games, the magic circle is more distinct than other traditional games, such as board games and sports, where reality and the game are still somewhat connected by the reality of physical space. With video games, for the most part, the magic circle is distinctly digital, with a more abstract boundary between man and machine. In a way, this makes the magic circle of video games all the more immersive. First and foremost though, the game itself must create the magic circle by establishing rules with gameplay and/or narrative first to keep the player inside the circle. Once these criteria are met, the ludic space of the video game can begin to assist in the formation of an effective magic circle. It is job of the game designer to find meaningful play in architecture. In game design, game designers must either invent or manipulate environments in order for them to facilitate play. Video game architecture is more than just virtual reality. It is beyond a simulation or science fiction of the real world. Video game architecture is architecture that must accommodate play.

> The magic circle of a game is the boundary of the game space and within this boundary the rules of the game play out and have authority.[34]

[34] Salen and Zimmerman 2004

6 | FLOW

While the idea of the magic circle explains how games affect spaces, it does not explain how games keep players playing within those spaces. A game itself must be fun in the first place to enjoy. This is where the psychological concept of flow, first proposed by Mihály Csíkszentmihályi is his book *Flow: The Psychology of Optimal Experience,* comes into play.

> "Flow" is the way people describe their state of mind when consciousness is harmoniously ordered, and they want to pursue whatever they are doing for its own sake. In reviewing some of the activities that consistently produce flow—such as sports, games, art, and hobbies—it becomes easier to understand what makes people happy.[35]

When completing a task, flow occurs when both the skill level of the worker, player, etc., and the challenge level of the task are equally high. (Figure 6-1)

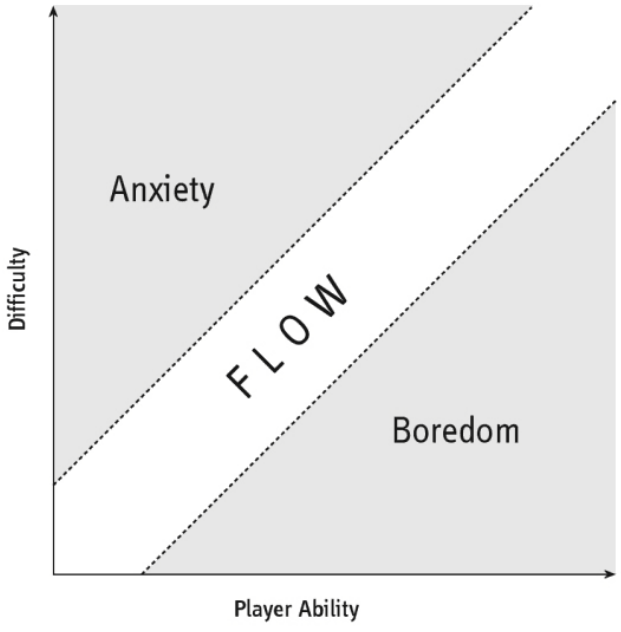

Figure 6-1: Graph of Flow, from Fundamentals of Game Design

[35] Csíkszentmihályi, Flow: The Psychology of Optimal Experience 1991, 6

When flow is achieved, the task becomes enjoyable and can be carried on infinitely until the balance is broken. As cited in the introduction Csíkszentmihályi identifies the following eight factors as accompanying an experience of flow:

1. *Clear goals:* it is clear what should be done; *Immediate Feedback:* one knows how well one is doing.
2. The opportunities for action are relatively high, and they are met by one's perceived ability to act; *challenges=skills*.
3. *Action and awareness merge*; one-pointedness of mind.
4. *Concentration on the task at hand*; irrelevant stimuli disappear from consciousness, worries and concerns are temporarily eliminated.
5. A sense of potential *control*.
6. *Loss of self-consciousness*, transcendence of ego boundaries, a sense of growth and of being part of some greater entity.
7. *Sense of time altered*; usually time seems to pass faster.
8. *Experience becomes autotelic* – if several of the previous conditions are present, what one does becomes autotelic, or worth doing for its own sake.[36]

These are known as the "characteristic dimensions of the flow experience"[37]. While not all are needed for flow to be experienced, many of these characteristics are identifiable in enjoyable tasks. From reading a book, playing an instrument, painting, or perhaps even working, flow is the experience when the task at hand becomes enjoyable, and the participant is in a state of happiness. It is evident how the experience of flow is easily applicable to games in general. How many times has one been lost in a board game with friends or perhaps a game of chess? Games in particular are a known flow activity.

> What makes these activities conducive to flow is that they were designed to make optimal experience easier to achieve. They have rules that require the learning of skills, they set up goals, they provide feedback, they make control possible. They facilitate concentration and involvement by making the activity distinct as possible from the so called "paramount reality" of everyday existence.[38]

[36] Csíkszentmihályi and Rathunde, The Measurement of Flow in Everyday Life: Toward a Theory of Emergent Motivation 1992, 60

[37] Ibid

[38] Csíkszentmihályi, Flow: The Psychology of Optimal Experience 1991, 72

All games are designed to induce a state of flow. As video games are games in the digital medium, many video game designers such as Jesper Juul have cited flow as an important aspect of video gaming as it keeps players attached to the game. If a game is too challenging, gamers will give up, and if the game is too easy, the gamer will become bored. Jenova Chen, creator of the games *Cloud* and *flOw*, is an advocate for the creation flow in video games. In his 2006 MFA thesis *Flow in Games* and 2007 article *Flow in Games (and Everything Else)*, Chen describes the intrinsic flow in modern video games.

> As the result of more than three decades of commercial competition, most of today's video games deliberately include and leverage the eight components of Flow. They deliver instantaneous, accessible sensory feedback and offer clear goals the player accomplishes through the mastery of specific gameplay skills.[39]

Chen calls the perfect balance of challenge and abilities the "Flow Zone", where the player become lost in the game's gameplay and narrative. Chen suggests that games can easily generate flow zones by leveraging the amount of challenge throughout the game, adjusting as the game progresses (Figure 6-2). While this easily applies to the gameplay of a game, such as the amount of enemies you must face, or difficult of hitting a target, space can also be challenging, such as a maze or an environmental puzzle. This thesis aims to discover the specific architectural formats that assist in the creation of flow in the magic circles of video games.

[39] Chen 2007

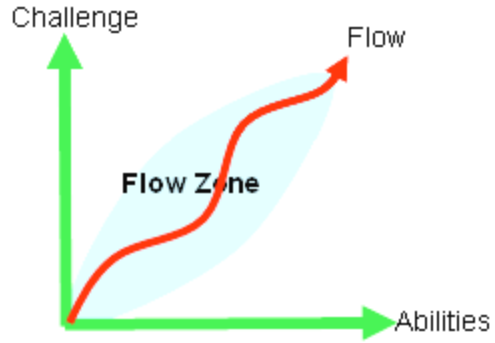

Figure 2 Player in-game Flow experience

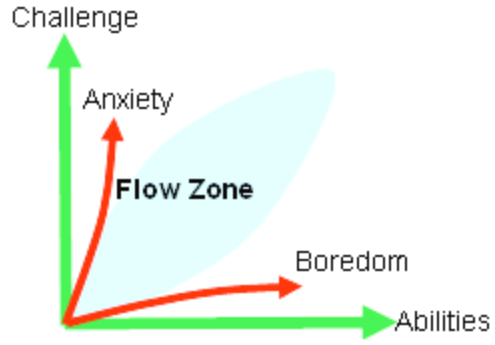

Figure 3 Player encounters psychic entropies

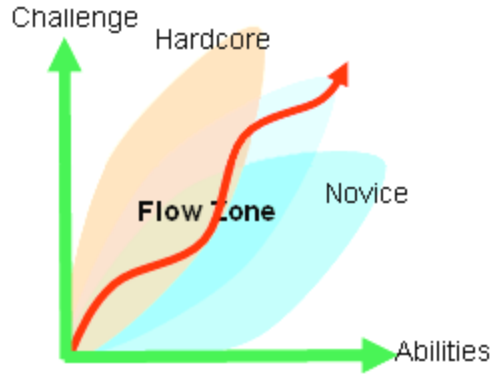

Figure 4 Different players and Flow Zones

Figure 6-2: Flow diagrams by Jenova Chen

7 | IMMERSION

This thesis mentions immersion as a reason for choosing FPS and TPS games as the focus. In the first chapter of *Fundamentals of Game Design*, Adams uses a quote by the Romantic English poet, Samuel Taylor Coleridge, which exemplifies the tone of immersion in games:

> "…it was agreed, that my endeavours should be directed to persons and characters supernatural, or at least romantic, yet so as to transfer from our inward nature a human interest and a semblance of truth sufficient to procure for these shadows of imagination that willing suspension of disbelief for the moment, which constitutes poetic faith."[40]

While Coleridge was originally referring to the absence of skepticism, his want for a suspension of disbelief is just as relevant in game design today. Immersion could be described as "losing track of the outside world"[41]. Immersion in games allows a player to fully believe the artificial world they are playing in. Full immersion in a video game allows for the architecture in them to truly exist.

In this thesis, immersion exists similarly in terms of the magic circle and flow. In the magic circle, immersion contributes to the creation of a separate world from reality defined by a game. Without a certain sense of immersion, the magic circle cannot exist, since the player must suspense some belief in order to accept the rules of the game. Immersion is also a key component to the creation of flow in video games. As defined beforehand, flow involves the participant to be somewhat lost in the task at hand. In a sense, flow and immersion share a similar definition of suspension from the real world. However, the immersion created in the magic circle deals more with the artificial world created by the game, while the immersion generated from flow deals more with the immersion of tasks and challenges within a game.

[40] Coleridge, S.T., *Biographia Litteraria*, Chapter XIV from Adams 2010, 25

[41] Adams 2010, 25

8 | VIDEO GAME DESIGN

1. Games have goals.
2. Goals provide challenge to players.
3. It is the mental challenge of a game that provides the fun.
4. If the challenge is right, the player is in a state of flow. (If the challenge is too easy, the player is bored, if the challenge is too hard, the player is frustrated.)[42]

Game designer Jesper Juul describes this to be "the complete theory of video games." From *Pong* to *Halo*, these basic guidelines have driven game design. However, goals are always up for interpretation. Goals can be gameplay-based, as in, score the most points by getting the ball in the net, and/or story-based, as in defeat the evil dragon in order to rescue the princess. Henry Jenkins, the Provost's Professor of Communication, Journalism, and Cinematic Arts at the University of Southern California, writes in his paper *Game Design as a Narrative Architecture*, that modern game design is divided into two schools of thought: the Ludologists, those who argue that gameplay mechanics should drive design, and the Narratologists, those who rely on storytelling to design. As game designer Greg Costikyan puts it:

> "There is a direct, immediate conflict between the demands of a story and the demands of a game. Divergence from a story's path is likely to make for a less satisfying story; restricting a player's freedom of action is likely to make for a less satisfying game."[43]

Jenkins argues that there is a middle ground that relies on the video game spaces themselves.

> "Specifically, I want to introduce an important third term into this discussion - spatiality - and argue for an understanding of game designers less as storytellers and more as narrative architects."[44]

This portion of the thesis aims to understand the roles of narrative and gameplay in video games in order to eventually understand how space is created in video games to support both.

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[42] Juul 2007

[43] Costikyan 2000

[44] Jenkins 2004

8.1 | LUDOLOGISTS AND NARRATOLOGISTS

At the core of video games is the actual gameplay. Gameplay as described in *The Fundamentals of Game Design* consists of two things:

1. The challenges that a player must face to arrive at the object of the game.
2. The actions that player is permitted to take to address those challenges.[45]

A challenge is "any task set for the player that is nontrivial to accomplish"[46], such as getting the ball through the hoop in basketball. The rules of the game permit which actions can be performed in order to complete the challenge. In basketball, running and jumping with the ball, are permitted, but it must be dribbled when moving. For many game designers, gameplay is the very first thing to consider, since after all, a video game is a game. The argument for ludologists is that at the core of a game should be gameplay that entertains the player. Ernest Adams is a self-proclaimed ludologist, and his reasons for narrative in games show that there are there assist with the game:

1. Stories can add significantly to the entertainment that a game offers.
2. Stories attract a wider audience.
3. Stories keep players interested in long games.
4. Stories help sell the game.[47]

In the case of many FPS and TPS games, the gameplay of shooting enemies is the core of the game, with an overarching story that ties the gameplay objectives together. The issue of narrative in games is a complex one. Narratologists argue that the games are becoming a complex means of interactive storytelling, where gameplay merely supports the further progression of the story. However, no matter how a game is focused, either or both are essential in the creation of the magic circle and flow in games as both elements act as the primary motivator for a player's actions in a game.

[45] Adams 2010, 11

[46] Ibid, 10

[47] Ibid 155-156

8.2 | THE MAGIC CIRCLE IN VIDEO GAMES

The very nature of video games being in the digital medium makes the creation of the magic circle quite simple, since the boundary between reality and make-believe is usually a television screen, or computer monitor. However, within the game itself, a magic circle still must be established by the concepts and rules of the video game.

> In single-player games, the player establishes the magic circle simply by choosing to play. In multi-player games, players agree upon a convention, which in turn establishes the magic circle. In other words, they all pretend together, and more important, they all agree to pretend the same things; that is, to accept the same rules. Although the pretended reality can seem very real to a deeply immersed player, it is still only a convention and can be renounced by the player refusing to play.[48]

Playing a video game is still playing a game that requires the adherence to rules. Even in completely fantastic virtual situations, rules still bind the player in a magic circle beyond the state of the virtual and physical. For example, in a racing game, the player has the ability to drive as fast as they possibly can in the car. However, if the player was to still adhere to the real–world rules of the road, rather than the rules of the game, they would simply be driving slowly in circles, and the magic circle is broken.

In an FPS or TPS game, if the player is willing to accept that gunplay and mayhem is part of the game, competition and challenge can exist. Similarly, the narrative of the game can help shape the magic circle of the video game by introducing concepts and rules through effective storytelling. If the player is willing accept the world of fantasy in a game, the magic circle is maintained. In both cases, the player must accept the conventions of the game in order to fully experience the game. In many cases, video games allow players to carry out actions they would otherwise be unable to do in the real world by accepting the rules of a game and rejecting the rules of reality.

[48] Adams 2010, 5

It is important to note that the concept of the magic circle with regards to video games is currently a point of contention. In his 2008 paper, *The Magic Circle and the Puzzle Piece*, Jesper Juul presents the argument between designers whether the metaphor is still relevant in the new medium of video games, opposed to traditional games. In *Synthetic Worlds: The Business and Culture of Online Games*, author Edward Castronova argues that the magic circle is actually permeable between the real and virtual through the introduction of markets, politics, and law.

> ...the membrane between synthetic worlds and daily life is definitely there but also definitely porous, and this is by choice of the users. What we have is an almost-magic circle, which seems to have the objective of retaining all that is good about the fantasy atmosphere of the synthetic world, while giving users the maximum amount of freedom to manipulate their involvement with them.[49]

The argument in general is that the metaphor of the magic circle may be too binary a term to place on to the current state of video games. However, this thesis still uses the term magic circle to describe the boundary between real and virtual, as space in video games is still a relatively non-permeable aspect of the medium. While the social interactions and market exchanges that occur in games may cross into the real world and vice versa, the spatial environments of a video game are more likely to stay inside the virtual realm. Even if the term magic circle were not to be used in this thesis, the argument still remains that the rules and conventions of a video game change our implied meanings of space within the game.

[49] Castronova 2005, 159-160

8.3 | FLOW IN VIDEO GAMES

Video games in general are designed for the creation of a flow state. Although the term "flow" is used more to manage difficulty in *Fundamentals of Game Design*, Adams uses the term immersion in a manner similar to this thesis as "losing track of the outside world". While not specifically stated, many aspects of a game's narrative and gameplay immersion are in direct correlation with the dimensions of the flow experience. Adams describes three main types of immersion created by video games: tactical, strategic, and narrative.

> **Tactical immersion** is the sense of being "in the groove" in high speed action games. It's sometimes called Tetris trance. When playing such a game, the action is so fast that your brain has no time for anything else, you don't have any time to think about strategy or a story line; the game is mostly about survival. To encourage tactical immersion, you must offer the player dozens of small challenges that can each be met in a fraction of a second. These small challenges must be fairly similar to one another – such as an arcade shooter. Abrupt changes in the gameplay destroy tactical immersion.[50]

In FPS and TPS games, this main "action" is usually simply to defeat enemies. Especially in multi-player deathmatches, such as those in the *Call of Duty* and *Halo* franchises, action is fast paced and hectic, relying on the hand-eye coordination of the player. Even in games with some form of narrative, these games are about the instant gratification of a kill and the ability to survive as long as possible. Many action oriented characters are godlike beings that are able to power through hordes of enemies. In many cases, there is a healthy balance between the amount and intelligence of the enemies with the strength of the player character, to provide equal opportunities for challenge and reward. Flow is maintained by a constant stream of evenly paced action and obvious goals.

[50] Adams 2010, 26

> **Strategic immersion** occurs when you are deeply involved in trying to win a game, like the immersion of the chess master: observing, calculating, and planning. You don't think about story, characters, or the game world but focus strictly on optimizing your choices. To experience strategic immersion, the players must understand the rules of the game clearly so that they can plan actions to their maximum advantage. Strategic immersion breaks down id a game confronts players with a situation they have never seen before or if the game contains too many unpredictable elements. Unexpected or erratic behavior makes it impossible to plan.[51]

Strategic immersion may occur more frequently in the TPS genre as they tend to require more careful planning towards an objective due to a gameplay aspect such as stealth. In games such as the *Splinter Cell* (Figure 8-1) franchise, the player's character is relatively weak compared to the tank-like avatars presented in most action games, and must rely on careful planning to avoid enemies as much as possible. FPS and TPS role-playing games such as *Fallout 3* and the *Elder Scrolls* series, while still featuring action heavy sequences, incorporate strategy into battles including the conservation and use of ammo, health, spells, portions, etc. Puzzle-platform games such as *Portal* present the environment as a puzzle that requires strategy to solve. In these cases, problem solving becomes the challenge in these games that must be balanced to create flow.

Figure 8-1: Splinter Cell: Double Agent

[51] ibid

> **Narrative immersion** is the feeling of being inside a story, completely involved and accepting the world and events of the story as real. It is the same immersion as that produced by a good book or movie, but in video game, the player is also an actor within the story. Good storytelling – interesting characters, exciting plots, dramatic situations – produces narrative immersion. Bad storytelling – two dimensional characters, implausible plots, or trite situations – destroys narrative immersion, and so does gameplay that is inappropriate in the context of the story. If a player is immersed in a story about being a dance, the gameplay should be about dancing, not about flying a plane or commanding an army.[52]

Narrative immersion is closely linked to the emotions of the player. Emotional situations in the narrative of a video game can drive a player through the game, presenting inherent goals to drive a player's actions. In a sense, the player cares about what is happening in the game. For example, in *Half-Life 2*, perhaps one of the greatest narrative-based FPS games ever made, the player is quickly immersed in the oppressive, fascist conditions of "City 17". Feeling the turmoil of its inhabitants makes the goal of the game, to destroy the aliens invading the world, an easy task (Figure 8-2). Furthermore, a strong narrative will keep a player wanting more, to experience the next scene in the plot, essentially creating narrative goals.

Figure 8-2: Half-Life 2 scripted scene

[52] ibid

A truly immersive FPS or TPS game is one that creates flow. Each type of immersion presented by Adams is also a strategy for flow. The first two cases, tactical and strategic, are gameplay-based methods that generate flow. They present clear goals and immediate feedback to the player in control through the mechanics of defeating enemies or problem solving. Narrative in games creates flow by setting up points in a storyline. Goals are usually to survive or perhaps solve a problem to reach the next chapter in the plot. Each strategy acts as both a means to initially motivate the player's actions, as well as to keep them motivated throughout the game. In many cases, a great game FPS or TPS game is one that incorporates all three strategies to create flow in video games. For example, the third person shooter/role playing game *Mass Effect 2* uses a leveling system that allows the player's character to become more powerful the more actions they accomplish, including defeating enemies, completing missions, or helping others. Within conflicts, the player can command AI squad members to attack or find cover to strategically win battles. When not fighting, the player can engage in dialogue with characters to gain depth in the narrative and to progress the storyline. As video game technology advances, newer games are able to incorporate an expansive variety of ways to immerse players in a state of flow.

Figure 8-3: Mass Effect 2 uses multiple strategies for immersion.

9 | GAME WORLDS

> One of the purposes of a game world is simply to entertain in its own right: to offer the player a place to explore and an environment to interact with.[53]

Adams uses the term "game world" to describe the artificial universe in which a video game occurs. Many games that rely solely on gameplay do not necessarily need a game world, merely the board and game pieces. Puzzle games like *Tetris* and *Bejeweled* have no tangible game world and perhaps a thin narrative to help understand the game. FPS and TPS games, however, have always relied on game worlds to support gameplay and narrative. From World War II Europe in *Call of Duty* to the fantastic ring-shaped planets of *Halo (*Figure 9-2*)*, game worlds and their rules help sustain a player's interest in the game, both within and beyond narrative and gameplay. Due to the perspectival qualities of FPS and TPS games, their game worlds must be fully realized in three dimensions, and have perhaps the most complex game worlds of the video game genres.

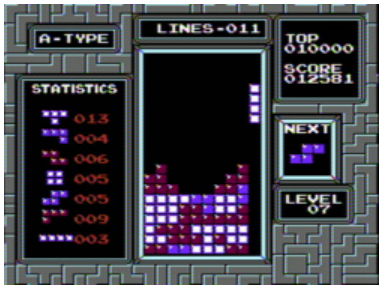

Figure 9-1: Tetris

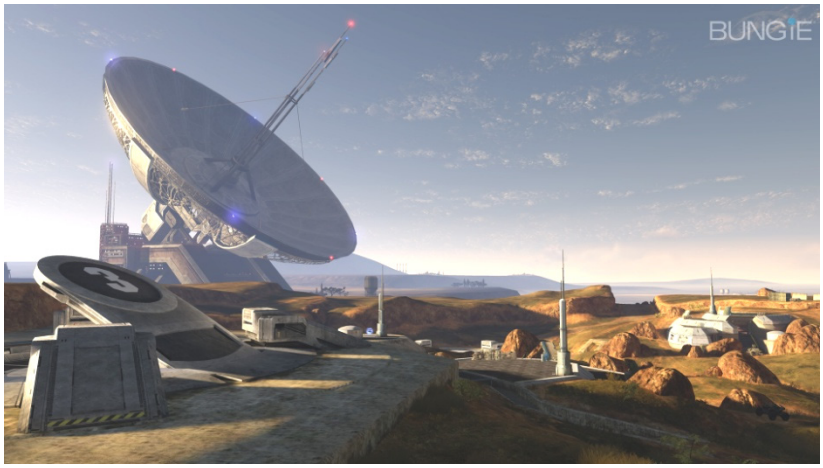

Figure 9-2: Halo 3

[53] Adams 2010

Game worlds and their spaces are unique to architectural design as they do not exist in the physical world, and thus are not constrained by cultural, physical, political, or social rules that exist in real life. This gives designers a unique opportunity to design entire worlds from scratch. Designers can design everything from the culture, sounds, physics, and geographies that exist in these worlds. As such, the architecture that populates these worlds can be truly unique to the physical world as they are defined by their own cosmologies. However these worlds still need to support the gameplay and narrative rather than overshadow them, otherwise the designer is simply designing a digital world, not a game or story.

9.1 | GAME DESIGN AS NARRATIVE ARCHITECTURE

If observing without any game design knowledge, the debate between these two schools of thought may seem trivial, even ridiculous. However, in the context of architectural design, this conflict could be equivalent to the issues of designing a building. Does one start with the site or the massing parti? Does environmental design drive the core design first, or is it applied later to enhance the building? In architecture there are constant struggles between the art of design, the site conditions, and realities of construction that, if balanced incorrectly, can make for a bad building. The issue between narrative and gameplay is equally perplexing to game designers. However, there may be a compromise, or at least a support, through the design of video game spaces. In *Game Design as a Narrative Architecture*, Henry Jenkins introduces the concept that space itself is a third aspect of game design.

> I hope to offer a middle ground position between the ludologists and the narratologists, one that respects the particularity of this emerging medium - examining games less as stories than as spaces ripe with narrative possibility.[54]

Jenkins posits that space plays an equally important role as narrative or gameplay, and perhaps a bridge between the two. While gameplay and narrative are no doubt needed in video games as basis, space is also required for a memorable experience.

[54] Jenkins 2004

> Monopoly, for example, may tell a narrative about how fortunes are won and lost; the individual Chance cards may provide some story pretext for our gaining or losing a certain number of places; but ultimately, what we remember is the experience of moving around the board and landing on someone's real estate.[55]

In the end, it is the playing field itself that needs to exist in order for either, or both, gameplay and narrative to occur. The following chapters aim to understand the creation of the magic circle in video game spaces, as well as the basic tenants in the creation of flow in video game spaces that result in successful FPS and TPS games.

Figure 9-3: A Monopoly board

[55] ibid

10 | THE MAGIC CIRCLE AND SPACE

> The fact that the magic circle is just that -a circle- is an important feature of this concept. As a closed circle, the space it circumscribes is enclosed and separate from the real world. As a marker of time, the magic circle is like a clock: it simultaneously represents a path with a beginning and end, but one without beginning and end. The magic circle inscribes a space that is repeatable, a space both limited and limitless. In short, a finite space with infinite possibility.[56]

The magic circle is a boundary that separates the real world from the fantasy of play. Spatially, in the physical world, physical barriers and separations allow for certain fantasies to occur. The walls of a stadium, the container of a sandbox, or the edge of a playground, all provide a perimeter of protection that allow for a new set of rules to be played out within. In these spaces, grown men are allowed to tackle one another for a ball, a child can build a castle, and a group of children are allowed to run and climb as they please. Furthermore, the implied meaning of these spaces is transformed. A set of posts is now a goal, a pit of sand is an open concept for construction, and a series of metal tubes on a wood frame is considered a gauntlet of challenges. The Amsterdam Orphanage by van Eyck is an example of a building envelope that allows for the transformation of space through play:

> They are always building tents where they can get together with their friends. They transform the large blocks into vehicles, houses, or boundary markers.[57]

Within the confines of a building form that could easily be a university campus or a hospital, the spaces and objects of the Orphanage are changed due to the children's "need to live out fantasies and lose themselves in play"[58].

While enclosures and boundaries will be explored in more detail in following sections, the magic circle in video game space is usually a virtual barrier that prevents players from moving beyond the play-ground of the game. Using the example of a racing game again, the game space is limited to the race track. Although the rest of the environment

[56] Salen and Zimmerman 2004, 95

[57] Strauven 1998, 287, from a brief by Frans van Meurs

[58] ibid

around the track may be modeled, including landscape and cities, they are inaccessible to the player, but serve as set pieces aiding in the aesthetic and atmospheric immersion of the game (Figure 10-1). This inaccessibility also ensures that players don't drive straight through fields to avoid a hairpin turn.

Figure 10-1: The edge of a map in Half-Life 2 using "noclip"

Similarly, in an FPS or TPS game, much of the environment may be modeled, but many spaces cannot be reached. These barriers and enclosures enforce the rules of the game, and add challenge to the game concept. In multi-player games, the boundaries ensure that the game is played within the confines of map, allowing for equality for all individuals in play. In a single-player game, the boundaries ensure that the player does not deviate from the desired space or even narrative.

Figure 10-2: From office to battlefield in Modern Warfare 2

Within these boundaries meanings of spaces can be changed by the rules of the game. Much like the example of hide-and-seek, the rules of a game can transform a space from intended or perceived use (Figure 10-2). Due to the endless possibilities of virtual space, it is possible for a suburban neighbourhood to be the location for a military deathmatch, or the void of outer space to be a play-ground for capture the flag. The rules of the game can transform architecturally trivial objects such as obstacles and hallways into spaces of enjoyment and challenge. Furthermore, the un-built world, such as landscape and vegetation, become more architecturally relevant in some cases. Valleys, mountains, and caves can be designed just as easily as the built world, allowing designers to shape the natural world to suit the rules of the game. To players, these elements are no longer just set pieces, but crucial elements in gameplay and narrative (Figure 10-3). A forest can provide cover for an archer, a deep river may block the way to a destination, and a valley can funnel a hero to an enemy.

Figure 10-3: Farcry 2's African landscape

The rules of play allow for spatial organizations that could be considered inefficient or cumbersome, to become spaces of enjoyment and challenge. As long as the player is willing to accept these transformations, the magic circle is maintained.

11 | CHARACTERISTICS OF A FLOW SPACE

This thesis has established that gameplay and narrative are key components to the creation of flow in video games, using the characteristic dimensions of flow as a basis. Similarly, it may be possible to distinguish spatial dimensions that can assist in the creation of flow in video games. Based on the characteristics introduced by Csíkszentmihályi, this thesis presents six general spatial formats that contribute to spaces of flow in video games:

1. *Spaces have nodes*; clear points in space can guide a player's actions, even in the absence of narrative and gameplay.
2. *Dead-ends, barriers, and paths* can provide immediate feedback for a player's movement through space.
3. *Enclosures* ensure the task is concentrated in a finite amount of space to avoid deviation from the intended gameplay or narrative; and can contribute to the intensity of a game.
4. *Challenge* can be generated by space given the ability or limitations of the player's avatar. Some examples include, but are not limited to, obstacles, visual baffles, and environmental puzzles.
5. Challenge can be *balanced* by a thoughtful implementation and organization of these devices into spatial modes.
6. If several of these dimensions are effectively implemented, space assists gameplay and narrative to form an *autotelic experience*.

The following sections will expand on each of these dimensions and provide tangible examples to elaborate. While games employ a variety of graphical and interactive means to help the flow experience in space, such as in-game maps, markers, and graphical symbols, this thesis observes the specific spatial choices game designers use to promote flow in video games. For the purposes of this thesis, a space may be called a "map" or "level". The standard gameplay of an FPS or TPS game is to move through space while complete objectives such as eliminating enemies, reaching a destination, disarming a bomb, or a combination of several objectives. As such, space can play an important role in both guiding and challenging players through a game (Figure 11-1). A balance of both can assist in the creation of flow and an enjoyable play experience.

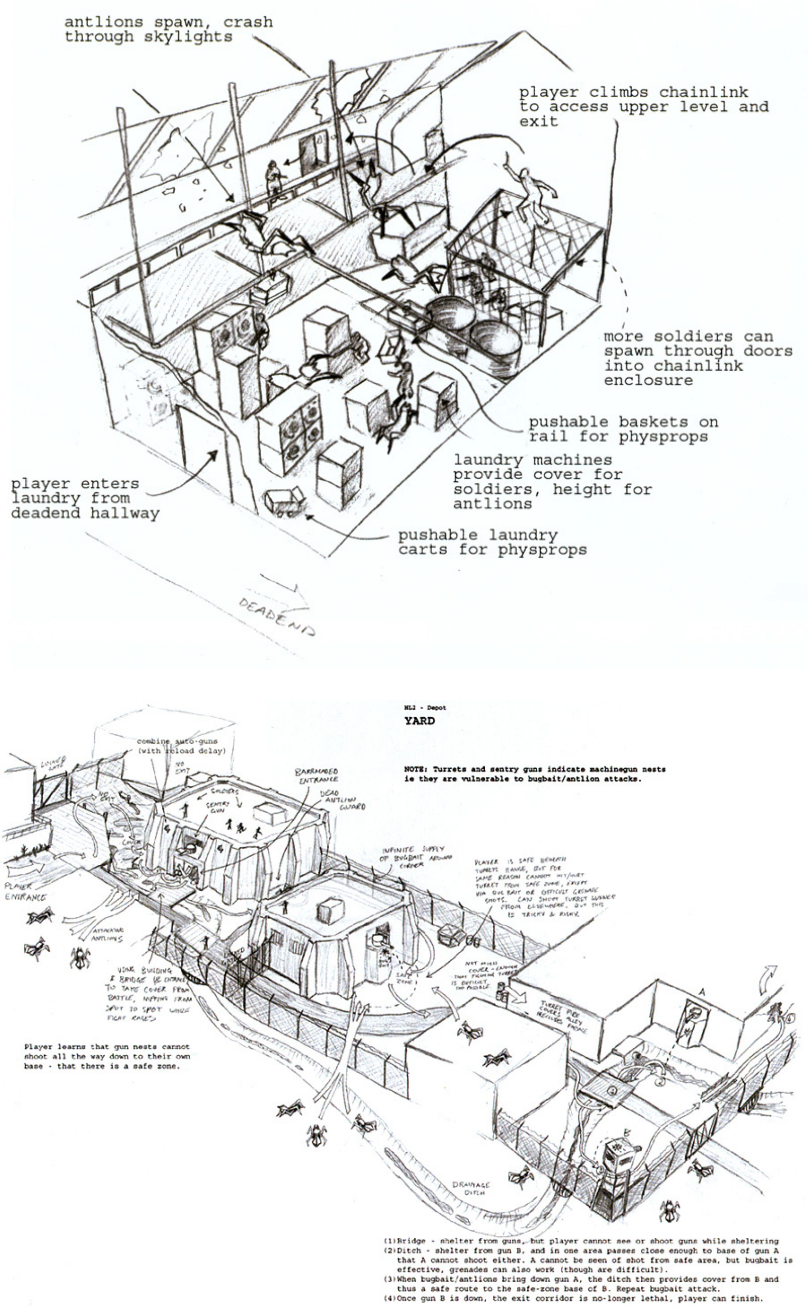

Figure 11-1: Half-Life 2 schematic designs by Eric Kirchmer

11.1 | NODES

As Jesper Juul stated, "Games have goals". This works in conjunction with flow, as clear goals are a characteristic of flow. As games continue to have more complicated environments, it also becomes easier to become literally lost in spaces. While a certain amount of being lost is part of the challenge of video game spaces, it is also important to have some form of navigation in a game. This section observes how nodes in video game space can help in the navigation of space to create clear goals. For the purposes of this thesis, nodes are, in a spatial sense, points or areas in space that can be distinguished in a field.

In *No More Wrong Turns: Game Design tools and Level Design methods that help players better traverse your game worlds*, author Martin Nerurkar, an architecture graduate turned game designer, describes two main navigational tool categories in video games: discrete and immersed.[59] Discrete tools are those that are separate from the actual environments and are more likely to be part of the graphical user interface (GUI) of the game.[60] These tools include maps, markers, and compasses. These are all graphical tools that deal with the actual design of the video game mechanics or sometimes narrative. These navigation tools are used consciously by the player.

This thesis is more concerned with the immersed navigational tools present in video games. Immersed tools are tools that are integrated into the environment. Nerurkar names three immersed navigation methods: attract, identify, and guide. Within these methods are various techniques, such as contrast, motion, pickups, characters, signs, and style. Nodes in video games fall under the "attract" and "identify" methods. In *No More Wrong Turns*, nodes could be called "weenies" and "landmarks".

> A Weenie is a term taken from the Disney theme park designers. It refers to a large structure in the distance that's clearly visible to the theme park visitor. What these weenies do is give reference points for navigation within the park as whole. Additionally they also look interesting and important so that the visitor wants to come closer and check them out. The same principle can be applied to Level Design.[61]

[59] Nerurkar 2009, 2

[60] ibid

[61] ibid, 7

In video games, weenies usually take the form of towers in the distance. While spatially they are not necessarily part of the environment, they sometimes serve as actual points of destination that the player will reach. Weenies fall under the "attract" category. Landmarks are identifying features that are "immediately visible features of the environment"[62]. Examples include fountains, statues, large vehicles, or bridges. While Nerurkar's descriptions of weenies and landmarks are fairly ornamental and stylistic, their concept can be expanded spatially into the concept of nodes. Nodes in this thesis could include courtyards or multilevel buildings within a landscape or urban setting. Nodes are points or spaces on a video game map that spatially distinguishable from the rest of map that both guide the player to objectives, as well as help them orient themselves in space as reference points (Figure 11-2).

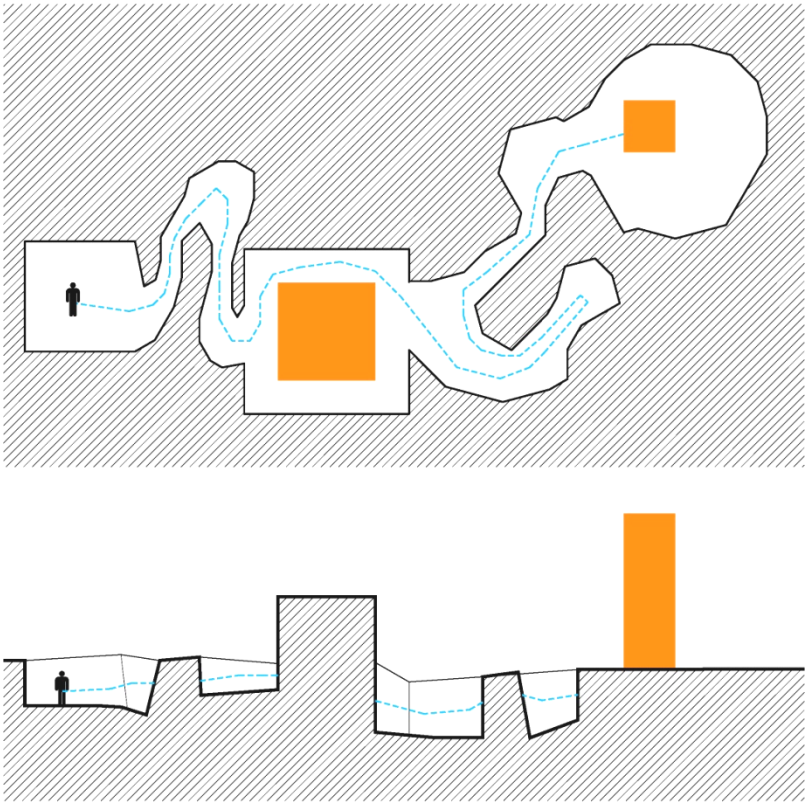

Figure 11-2: Typical single-player nodes in space (Plan and Section)

[62] ibid, 9

In single-player FPS and TPS games, a player usually understands where to go through game objectives or narrative. However, once these objectives are established, the player still usually requires visual cues to identify themselves in space. In *Half-Life 2*, the objective of the game is essentially to free humanity from alien oppressors. Throughout the game, the alien's tower fortress, the Citadel, is present throughout the game and acts as a reference point for the player both in space and in the narrative as the player moves closer to it (Figure 11-4). In the book *Half-Life 2: Raising the Bar*, game designers, such as Marc Laidlaw, explain their design choices in the game:

> We wanted the end of the game to feed directly into the beginning. From the first seconds of the game, we wanted the player to see where his journey would take him, so that when he finally got to the Citadel, he would have the strongest possible relationship with it.[63]

While an extreme example, the Citadel centralizes the entire space of the game. In other single-player games, buildings, landmarks, and other spatial masses serve as nodes that encourage the movement from one point to another, as well as referencing the narrative.

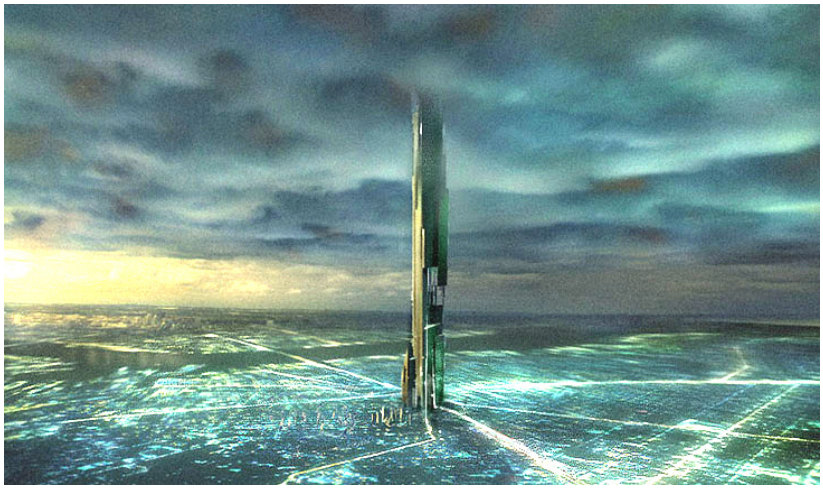

Figure 11-3: The Citadel, Half-Life 2 concept art by Viktor Antonov

[63] Laidlaw, Valve 2004, 180

Figure 11-4: The Citadel and the City 17 Inner Wall, Half-Life 2 concept art by Viktor Antonov

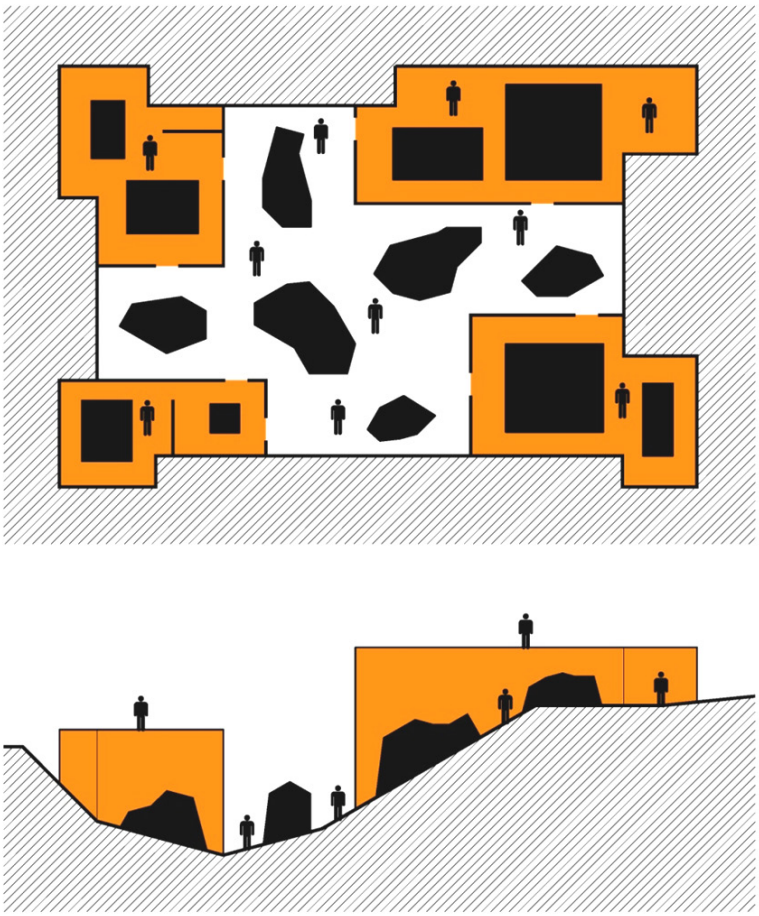

Figure 11-5: Multi-player nodes in space

In multi-player games, various nodes act as both waypoints for discovery and memory (Figure 11-5). Since there is rarely a narrative in these games, nodes play a greater spatial role in creating goals for players. The classic map "Facing Worlds" in the game *Unreal Tournament* is an example of this concept (Figure 11-6). As a capture the flag map, the objective of the match is to retrieve the enemy's flag from their base and return it to your base without dying. For a first time player, the map provides two main nodes for the flag bases and allows the player to quickly assess the space.

Figure 11-6: Unreal Tournament, Facing Worlds

Even in a more complicated and less obvious space, such as *Call of Duty: Modern Warfare 2*'s "Highrise", a variety of nodes are present that guide the player in space (Figure 11-7). Once the player becomes used to map, these nodes become points of memory that that allow for more intense strategies to be developed.

Figure 11-7: "Highrise" loading screen

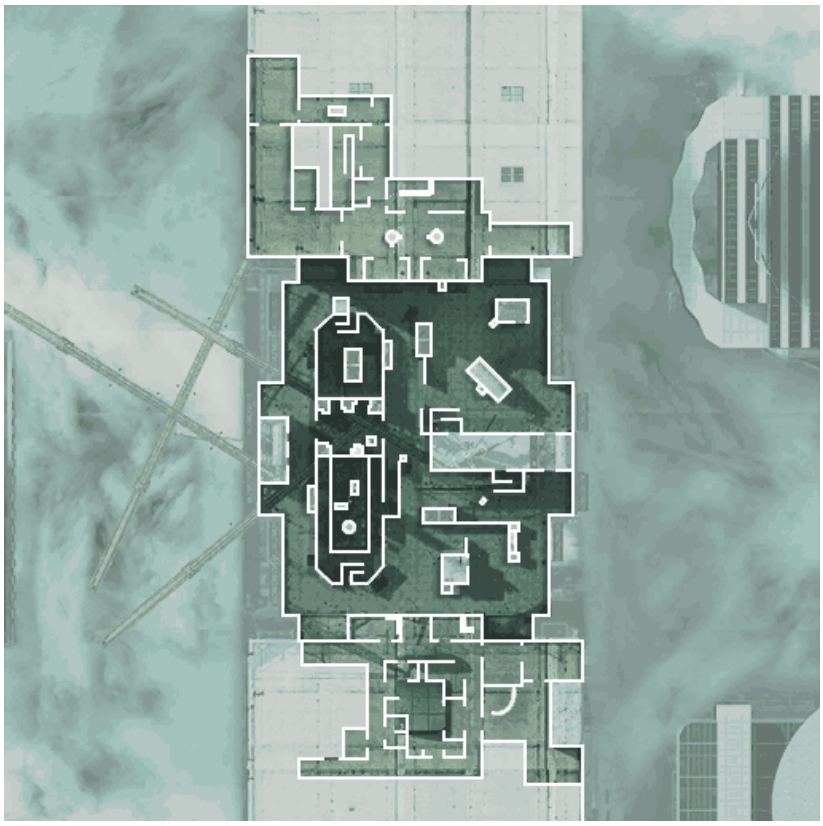

Figure 11-8: "Highrise" plan

The map takes place on the roof of an office tower with two office towers adjacent to the roof that open out to the roof. Within the map are offices, mechanical rooms, and elevator cabs that serve as both attractors and identifiers within the space. While players can identify them as different stylistically, there are more likely to identify them spatially. Note the two facing office spaces in the plan of "Highrise" opposed to the central mechanical spaces in the center of the map (Figure 11-8). Nodes are important to the creation of flow mostly so players understand where to move in space. Without a node in space, the field of play becomes infinite and without reference, causing goals to become unclear. Furthermore, these nodes allow for immediate feedback to a players location, allowing them to reference themselves within space.

11.2 | DEAD-ENDS AND PATHS

The concept of a dead-end is quite simple with regards to immediate feedback. In a maze, a dead-end means the player should turn around and rethink their decision. In a maze, players know how well they are doing by not getting stuck in front of a wall, and by moving forward. This is the simplest form of feedback from the space, without entering the realm of programmed instances such as locked doors or moving panels. The notion of dead ends is most prevalent and effective in single-player games. Since most single-player FPS and TPS games are linear, a dead end usually means that the player has taken a wrong turn.

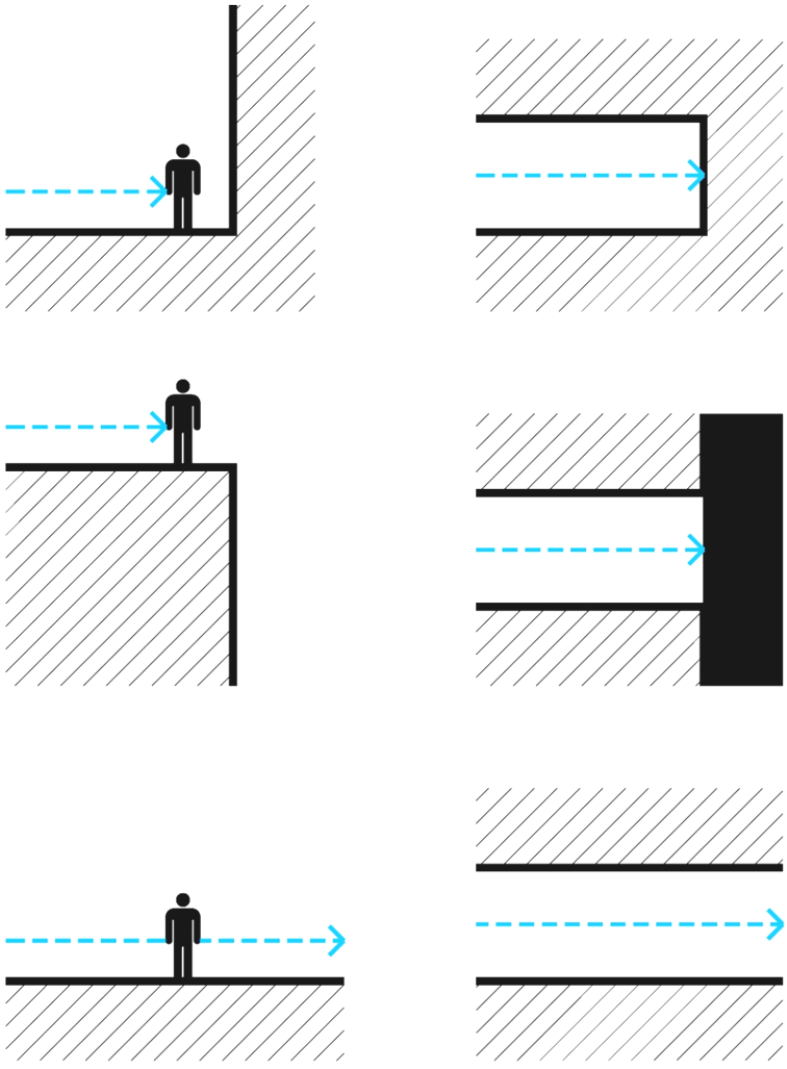

Figure 11-9: Dead ends and paths

While the concept of the dead-end is a simple one, it is still a means of immediate feedback generated by space (Figure 11-10). However this concept does not mean that all spaces require dead ends. In fact the opposite of dead-ends, paths, act as a clear measure of successful movement. In a multi-player game, most maps are designed with the least possible dead-ends and the most paths to allow for continuous circulation and constant action. The immediate feedback of dead-ends and paths ensures that the player is constantly aware of their success through movement.

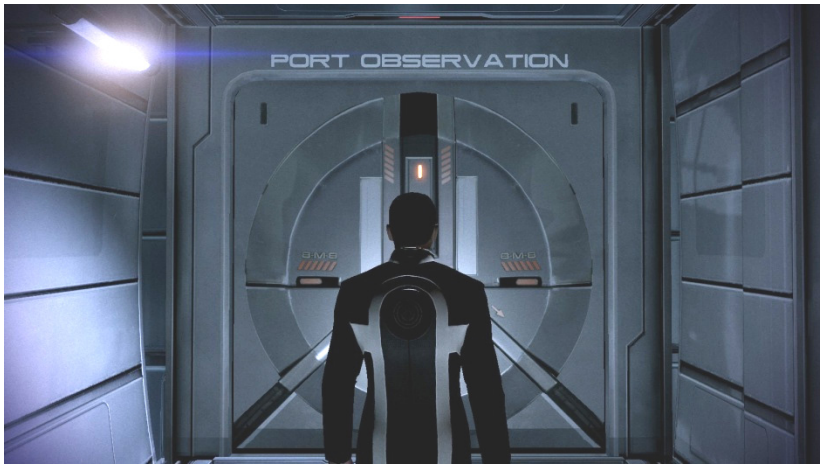

Figure 11-10: A locked door in Mass Effect 2

11.3 | ENCLOSURES AND BOUNDARIES

> In board games, the edge of the board is the edge of the game world. Because computers don't have infinite memories, the physical dimension of a computer game world must have an "edge" as well. However, computer games are usually more immersive than board games, and they often try to disguise or explain away the fact that the world is limited to help maintain the player's immersion.[64]

Game spaces are defined by their boundaries. Since virtual spaces are technically limitless in concept, boundaries help the player stay on the track of gameplay and narrative. Architecturally, game boundaries can be attributed to building envelope and site lines, or any other condition that limits the space in which one can design. In many games, the boundaries of the game are already defined by the game concept. If the entire game takes place in a building complex, such as a stadium or warehouse, the player is restricted to that environment and its architecture. These enclosures ensure that the gameplay or narrative is isolated, and as such, "irrelevant stimuli disappear from consciousness." [65] Furthermore, the scale and shape of these enclosures can determine the intensity of action or density of players to interact with.

In a field sport, such as soccer or football, the extent of the game is played within a predetermined line surrounding the field of play. If one was to move out of bounds, the referee would determine that a rule had been broken and the game resets. In a video game, there are no referees to keep players from straying from the field of play. As such, video game spaces need to create actual boundaries around the perimeter of play to ensure that the game stays on track. For the most part, the gameplay and narrative of the video game will determine the shape and size of the enclosure.

For example, *Half-Life 2* takes place in a fiction Eastern European city named City 17 during an alien invasion. Your character is a hero that must battle these aliens through city streets and interiors of buildings in order to reach the main hub of these aliens and destroy it. The story and gameplay is fairly linear: get from point A to point B without getting killed to save the world. Your character Gordon Freeman is

[64] Adams 2010, 91

[65] Csíkszentmihályi and Rathunde, The Measurement of Flow in Everyday Life: Toward a Theory of Emergent Motivation 1992, 60

limited in gameplay to running and shooting. As such, the boundaries the game's spaces usually form a strict path, even though in-game, the player feels as though they are in an open city during a crisis. The enclosure creates valleys that funnel the player into the action.

On the other hand, *Grand Theft Auto IV* also takes place in a fictional city, Liberty City (loosely based on New York City), yet the boundaries of the game encompass the entire Manhattan-esque city, given that your character can operate automobiles, boats, and aircraft. Furthermore, the narrative of the game involves travelling throughout the city, and features more gameplay mechanics than just shooting and running. These examples show how gameplay and narrative are in direct relation to the shape and scale of the boundaries in the game or the magic circle itself. In most situations, the magic circle and boundaries in video games share a similar definition, as they are both the boundaries that keep the player in the game.

The issue of boundary design in video games arises when the design moves beyond the realm of the building and into the urban and natural scale, where boundaries like walls, ceilings, and floors are less defined. If the world becomes limitless, the player may become lost and diverge from the course of the game. However, too obvious a barrier may destroy the immersion of the setting. Barriers affect the flow of games. Many games have been criticized for the lack of realism in their use of barriers. In the open-world superhero game of *Infamous*, the player character is able to manipulate electricity, scaling buildings, travelling great heights. However, in many situations, he cannot move past a simple chain link fence as a game world boundary (Figure 11-11).

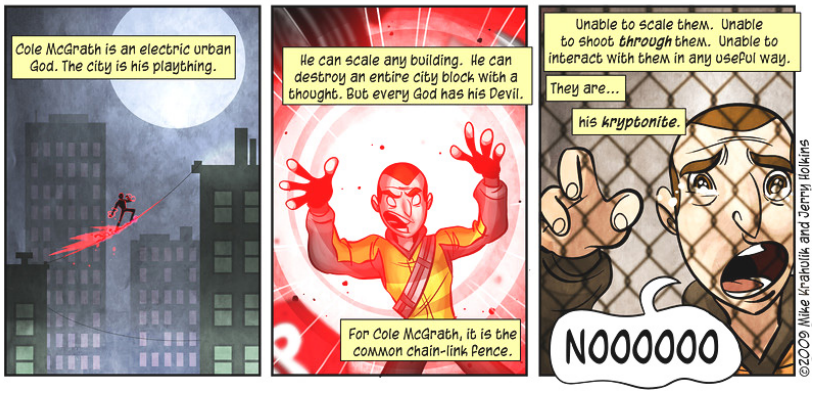

Figure 11-11: Webcomic Penny Arcade on Infamous' fences

In this case, these boundaries become a barrier to flow. Something that the player believes they can overcome in the magic circle suddenly becomes an obstacle, and can quickly ruin the immersion. Barriers exist to steer gameplay and narrative, but can also ruin these elements if executed insincerely. Some games use physical boundaries to restrict player movement. In many games that do not involve characters with superpowers, tall mountains, canyons, and buildings act as physical boundaries that cannot be passed. Other creative boundaries include fallen buildings; roads blocked by abandoned cars; or caved in exits and rubble. Anything that would be reasonably impossible to climb over can be a boundary.

Another more dramatic means of boundaries involves the possibility of death. Some games exist on islands surrounded by water that triggers drowning when travelling too deep. Others may be surrounded by lava or acid. In the *Modern Warfare* series, many areas appear to be open for travel, but are littered with landmines or contaminated by radioactivity, such as "Wasteland" from *Modern Warfare 2* (Figure 11-13). One of the most common "threatening" barriers is height. In the open-world, free running game *Mirror's Edge*, the player is a character that uses parkour techniques to transverse the rooftops of a futuristic city. While the gameplay allows for infinite means of reaching objectives, the character is still limited by the dizzying heights of the buildings she jumps between. In this case, the boundaries are logical and in no way interfere with the immersive cityscape (Figure 11-12).

Figure 11-12: The roofscape of Mirror's Edge

In a sense, the boundaries of a game space are the beginning stages of both the magic circle and flow. Given the narrative or gameplay of the game, boundaries can be easily set and clearly define the magic circle. For games without clear boundaries from the offset of design, the creation of boundaries in the game can aid in the generation of the magic circle beyond gameplay and narrative. Furthermore, the design of these boundaries contributes to the flow of a game. An effective boundary will keep the player on track and not distract them from the goals of the game. An ineffective boundary can both steer the player away from the intended goals of the game, and destroy the immersion of the game. The size and shape of the boundary is also related to the opportunities for action in the game. Multi-player shooter games tend to favour smaller, more equilateral enclosures to increase chance encounters while offering a wider range of movement. Single-player games tend to have long, narrow enclosures that limit exploration and direct players toward action. However, there are examples of games that break these conventions due to unique gameplay or narrative aspects. The “Case Study” section of this thesis demonstrates a variety of gameplay types and their resultant enclosures.

Figure 11-13: Radiation barrier of "Wasteland"(dotted lines)

Figure 11-14: Approaching the irradiated enclosure of "Wasteland"

11.4 | CHALLENGING SPACES

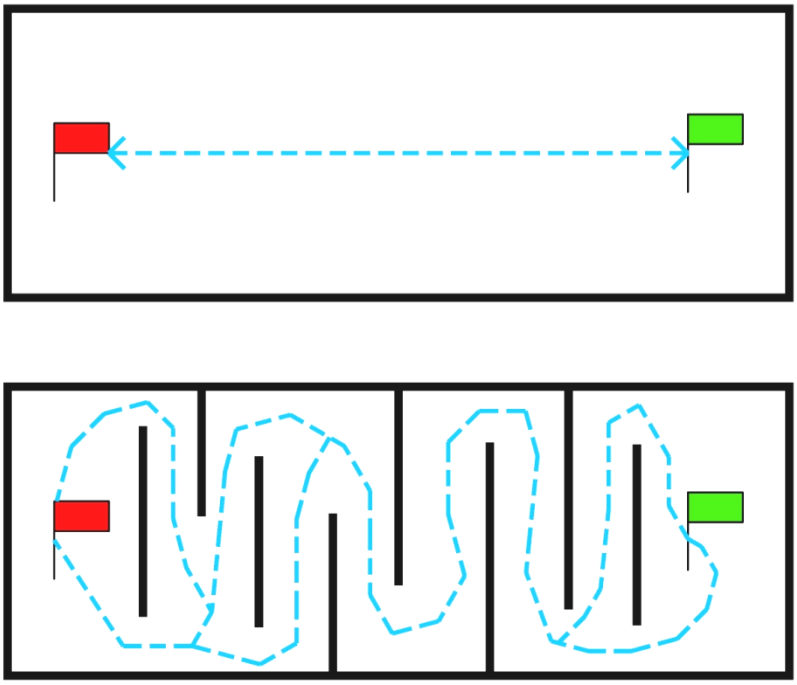

Figure 11-15: A simple space vs. a challenging space for CTF

What is a challenging space? In most cases, a challenging space in a video game is one that assists in keeping gameplay challenging. For example, a game of capture the flag requires players to steal the opposing team's flag and return it to their own flag without being tagged. While this game could be played on an open field, challenged could be eliminated given the speed of a player. However, if the field was littered with obstacles, the runner would now require agility, and the defending team could now use surprise and ambush to tag flag runners (Figure 11-15). With a new organization of space, the game is now riddled with new challenges. In general, a challenging space is one that impedes both movement and sight lines in order for more complicated interactions to occur between players.

Similarly in a game of deathmatch in an FPS or TPS multi-player match, a field would become an uninteresting bloodbath of players shooting blindly and managing to defeat other players. But if the space was then to be organized with corridors, towers, bunkers, and trenches, the space would allow for new strategies to unfold, creating challenge for a variety of playing styles. A tree or a car may provide cover against enemy fire. Furthermore, these obstacles and organization allow for greater chance encounters.

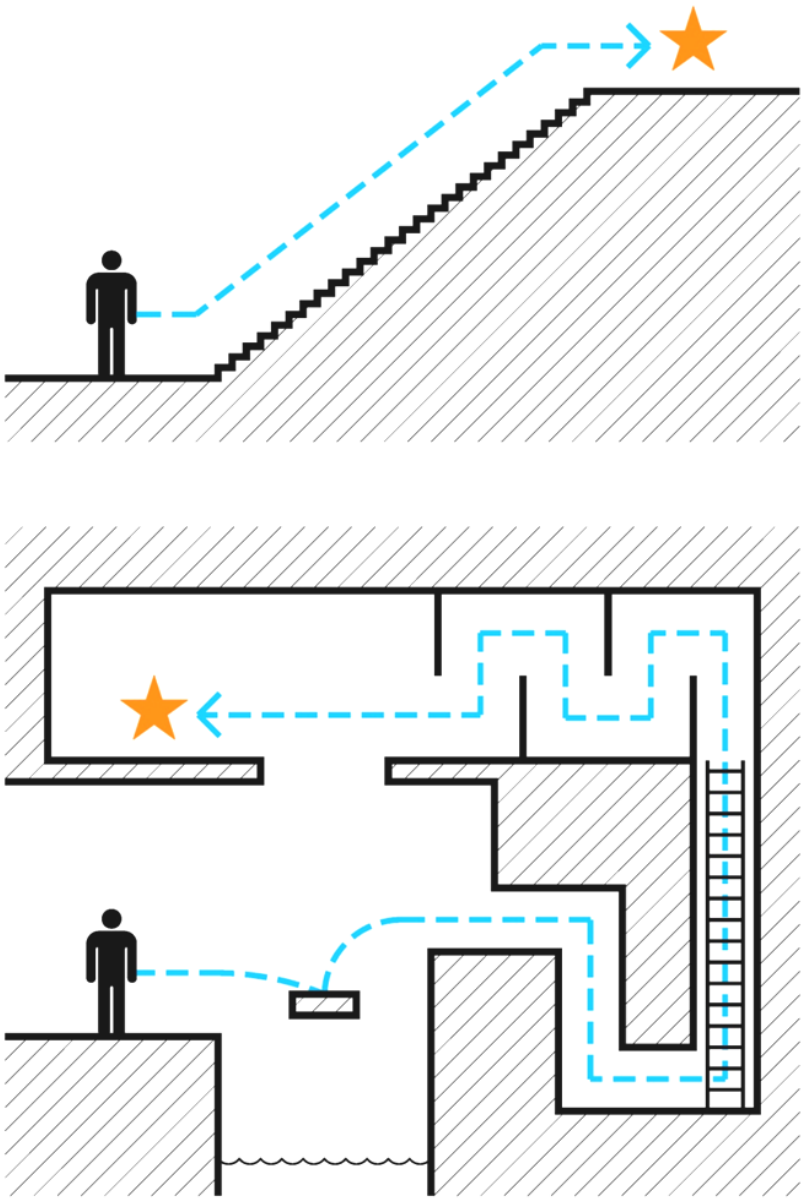

Figure 11-16: A simple vs. a challenging single-player experience

Space also provides challenge in single-player games. In many single-player games, the goal is to reach some sort of checkpoint to progress narrative and gameplay. Environmental obstructions usually provide a space similar to an obstacle course or gauntlet that challenges the player's movement, and impedes a straight path to an objective (Figure 11-16). For example, a deep river may stand in the way of reaching a checkpoint and the player must jump from rock to rock to reach the other side. While the overall journey to the Citadel in *Half-life 2* is linear, the game space is designed as a meandering path filled with obstructions to challenge the player (Figure 11-18). From *Raising the Bar*:

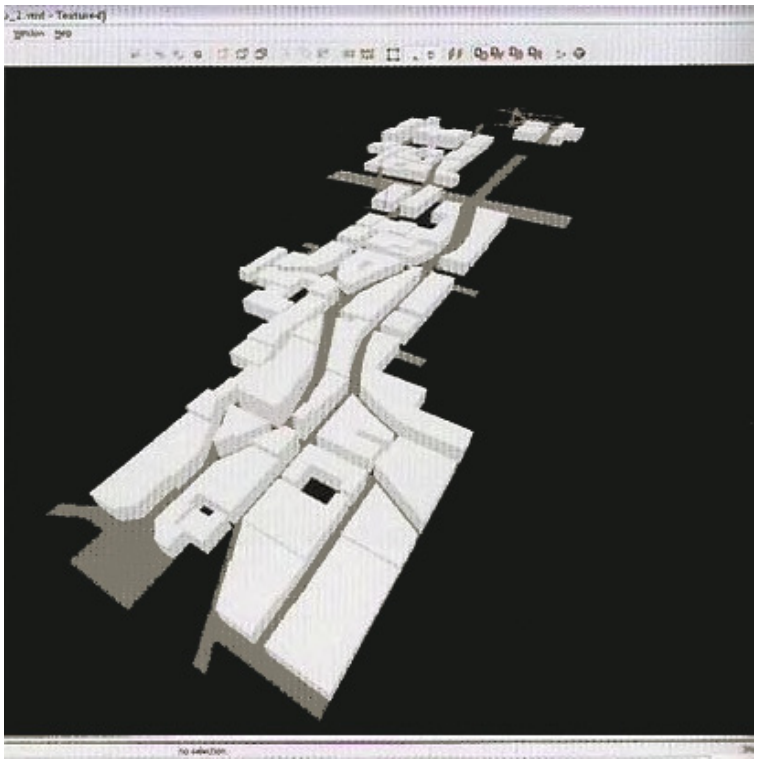

Figure 11-17: City 17, as laid out in Valve's Hammer level editor

> This shows the path from the Trainstation to the citadel, but progress in the game is never straightforward. Gameplay is deepened by imposing interesting obstacles, and forcing the player through intricate paths.[66]

[66] Valve 2004, 168

Figure 11-18: The player blocked by a collapsed bridge in Half-Life 2

11.5 | BALANCED SPACES

While spaces can be organized to challenge players in video games, the challenge of space must also be balanced in order to be not too difficult or too easy. However, not every game has the same spatial requirements, and must be balanced accordingly. In *Fundamentals of Game Design*, Adam introduces the concept of symmetric and asymmetric games.

> In a symmetric game, all the players play by the same rules and try to achieve the same victory conditions.[67]

In most cases multi-player FPS and TPS games are symmetric, in the sense that all teams or individuals are trying to achieve the same thing, whether it is killing the most enemies or capturing the most flags from the opposing force. As such, the spaces required for these games also tend to be symmetrical in nature. Since these games rely on the interactions between players, the spaces must allow for these interactions to occur equally for all players to enjoy the game. Given the nature of the gameplay, a symmetrical game space usually features a polar organization that offers an equal starting point for all players. These organizations may also feature continuous circulation throughout the map to allow for the equality of movement throughout a map.

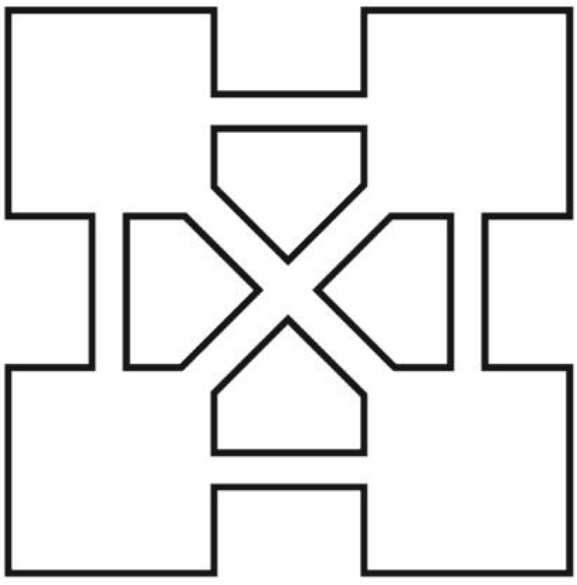

Figure 11-19: Network layout from Fundamentals of Game Design

[67] Adams 2010, 12

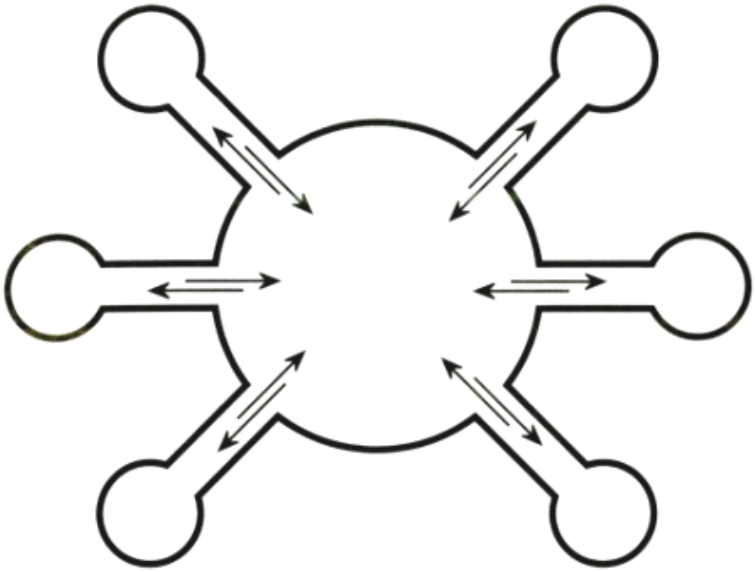

Figure 11-20: Hub-and-Spoke Layout from Fundamentals of Game Design

This equality in space ensures that all players are given equal opportunity to both win and lose. Although Adams does not link symmetrical games with a certain layout, he does present layouts later in the book that work well with the concept. Both the "network" (Figure 11-19) and "hub-and-spoke" (Figure 11-20) layouts described by Adams are examples of a balanced, symmetrical layout with polar organizations and a means of continuous circulation.

Figure 11-21: Modern Warfare 2, "Salvage"

Figure 11-22: Modern Warfare 2, "Salvage", plan

In *Call of Duty: Modern Warfare 2*, the map "Salvage" displays the properties of a symmetrical map. While not literally symmetrical, the map has a variety of polar starting points that are connected throughout the map with a series of valleys and corridors.

Figure 11-23: Modern Warfare 2, "Salvage" loading screen

Figure 11-24: Players face a horde of AI zombies in Left 4 Dead 2

> In an asymmetric game, different players may play by different rules and try to achieve different victory conditions.[68]

Single-player and co-op games are usually asymmetrical, where the "different players" are actually controlled by artificial intelligence. As such, an asymmetrical game will tend to have an asymmetrical or linear organization. In most cases, these games call for an individual or small group to push through a greater number of enemies or challenges (Figure 11-24). The resultant spaces are those that accommodate and encourage movement forward in a linear fashion (Figure 11-25), opposed to a loop circulation. A symmetrical space in an asymmetrical game could prove to be too difficult with the possibility of enemies approaching all sides. Furthermore, the linear spaces of single-player spatial organizations ensure the player maintains movement through the narrative, with a clear notion of backtracking if it occurs. Even in game spaces that provide divergent paths, such as the "parallel layout" (Figure 11-26) presented by Adams, the player's progress is still forward.

[68] Ibid 13

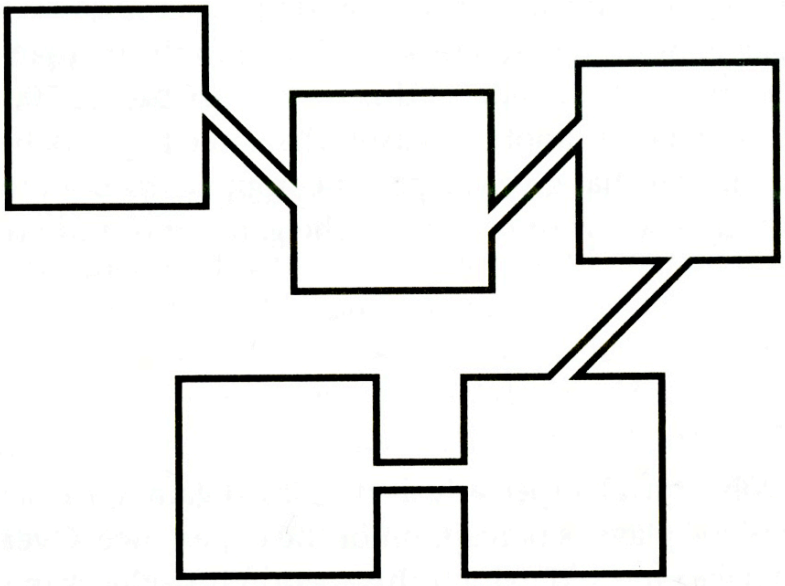

Figure 11-25: Linear Layout from Fundamentals of Game Design

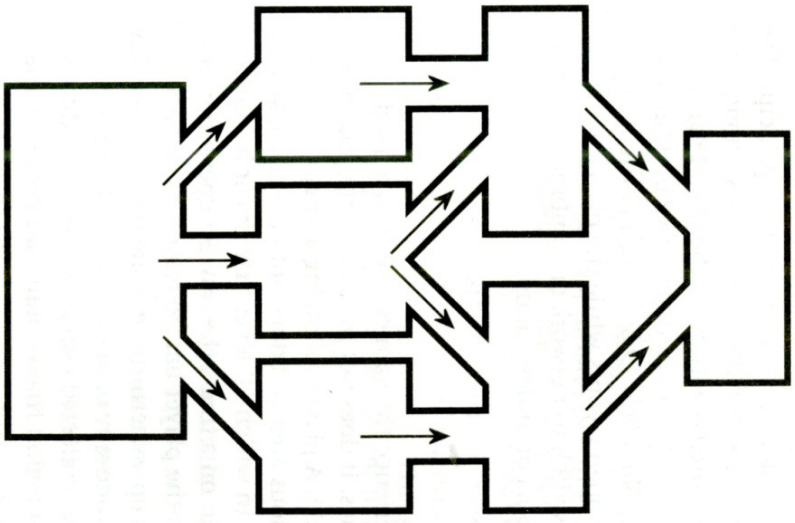

Figure 11-26: Parallel Layout from Fundamentals of Game Design

Beyond the overall layout are the specific spatial organizations of the barriers and baffles within the spaces that contribute to flow. Each cell of these layouts is still an open field that could require further design of an effective flow space. An addition of baffles, environmental hazards, and other obstacles, should be equally balanced based on the gameplay and narrative (Figure 11-27). For example a hidden nook may provide spaces of rest for healing and communication while open fields are ripe with action. From the scale of a city, to the scale of a room, a good map requires careful thought into the way it mediates challenge.

> To be enjoyable, a game must be balanced well – it must be neither too easy nor too hard, and it must feel fair, both to players competing against each other and to the individual player on his own.[69]

Figure 11-27: Cars used as visual baffles in "Wasteland"

[69] Adams 2010, 324

11.5.1 / PLAYTESTING

It is important to note within the discussion of challenge and balance that the video game industry utilizes a slew of prototyping and testing to ensure that games are balanced and fun. Almost all game developers have a quality assurance (QA) department that thoroughly tests a game before it is published.[70] While much of the testing is dedicated to catching technical issues such as bugs and glitches, there is also a portion of testing focused on the enjoyment of the game.

The process is iterative, where in-house play testers will play assigned portions of the game over and over again, noting discrepancies and areas that hinder gameplay or narrative. Game designers take into account the suggestions and modify the game accordingly, then repeat the process. This is known as "alpha" testing. This process is extremely repetitive to ensure that all situations and styles of play are considered. Once this stage is complete and the game is at a polished level, the game goes into "beta" testing, where the game is released to a select group of "end-users", players in the general public that have signed on to test the game. Here, the game is tested by a much wider range of players that report game issues similar to the alpha stage. After changes are made from beta testing results, the game is ready to be published.

Some developers, such as Valve, also observe testers as they play, noting how and where they move within the space. Learning from this data, developers are able to predict patterns and design spaces that work in conjunction with players' behaviours. In architecture, "space syntax" is a similar study that allows for the prediction of human interactions with space. Phenomena such as patterns of movement, awareness and interaction; density, land use and land value; urban growth and societal differentiation; safety and crime distribution are predicted based on quantitative analysis and geospatial computer technology.[71] In both space syntax and play testing, the design process is unique to conventional design development, as schematic design is heavily influenced by data gathered from end-users. That is to say, while much of the design can be guided by characteristics of flow, the final design is still heavily influenced by direct testing by players.

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[70] Ibid, 384

[71] Space Syntax Limited 2011. For more information, see Hillier, B. and Hanson, J., *The Social Logic of Space*, Cambridge University Press: Cambridge, 1984.

Figure 11-28: Battlefield: Bad Company 2, building destruction

11.6 | SUMMARY

Much like the characteristics of flow experience presented by Csíkszentmihályi, not all of these spatial characteristics of flow in video games are required to create flow, nor is each dimension a set rule in the design of a game space. While the characteristics introduced in these sections distinguish between single-player and multi-player quite dramatically, many modern games are blurring the line spatially, allowing more non linear organizations in single-player games, and more linear forms in team-based multi-player games. However, combinations of the proposed characteristics in any situation are sure to assist in the generation of flow in FPS and TPS games when gameplay and narrative are not enough to create the challenge.

Furthermore, the elements introduced imply static organizations, yet the advent of physics engines and advanced programming now grant spaces the ability to change and increase challenge as the game moves on. In *Battlefield: Bad Company 2*, buildings can be damaged and demolished with explosives, allowing the player to change the sight lines, paths, and overall strategies of the game (Figure 11-28). By the end of a match, the map is completely different from when it began. However, the basic principles still apply to these dynamic settings. Even the destruction must be balanced as to not create an open field of play by the end of the game. Creating space in video games is not only about making them interesting and fantastic, but also to support the flow, and ultimately the enjoyment, of the game. A great flow space is one that the player is not consciously aware of. In a great flow experience, gameplay, narrative, and space all work in conjunction to create a state in which the player's sense of awareness, time, and ego become lost in play.

12 | DETAILS

While this thesis focuses on the spatial properties of FPS and TPS games, it would be naïve to assume that space is the only architectural factor that contributes to the creation of the magic circle and flow in video game environments. Effective details, ornament, materials, and general aesthetics can help create atmospheric immersion and assist in guiding gameplay. While spatial modes are perhaps the starting points of the magic circle and flow in games, the details may be the final point. Details are the final touches to the set that add to the immersion of the game. Details can visually add to the magic circle by defining a completely separate world from reality. Furthermore, the effective placement and design of details in video games can hinder or help with a player's flow experience within a game. Details can refer to the general aesthetics/style of the game, ornamental dressings in space, or interactive details that contribute to the gameplay and narrative of the game.

The magic circle is built on rules that transform space. Similarly, the details in video game space are an aesthetic set of rules that help create an acceptable artificial world. Prior to the 18thcentury, details and ornament allowed for a unity in architecture, and in other art forms such as painting and sculpture. An overall cosmological understanding of the universe determined decorum of detail and style. Oddly enough, the unity of architecture and detail still exists today in the unlikely realm of video games. Every video game contains its own cosmology and rules that determine the unity of its aesthetics. In current first person video games, ornament and detail still play similar roles as they do in architecture. Interactive details act as visual clues for players to perform actions, while static details create an overall style or iconography to indicate setting and aid in the narrative of the game.

Figure 12-1: The Elder Scrolls IV: Oblivion

Static details and ornament in video games act much like set pieces and props in a movie to create a consistent setting, and aid in the narrative of the space. Areas are dressed with detail to create atmosphere and immerse the player in the fictional world. A basic example of this need for detail would be in a game set in a medieval fantasy world. Although the world may be fantasy, the architecture is still based on real world precedents (Figure 12-1). Vaulted ceilings, baroque columns, moldings, and statuary may create a convincing Baroque environment. Much like real-world architecture, placing a detail that is completely incongruent to the setting is unsettling, unless it is the desired effect. For example, an industrialized space station may be riddled with organic, fleshy details to evoke the horror of an alien infestation (Figure 12-2).

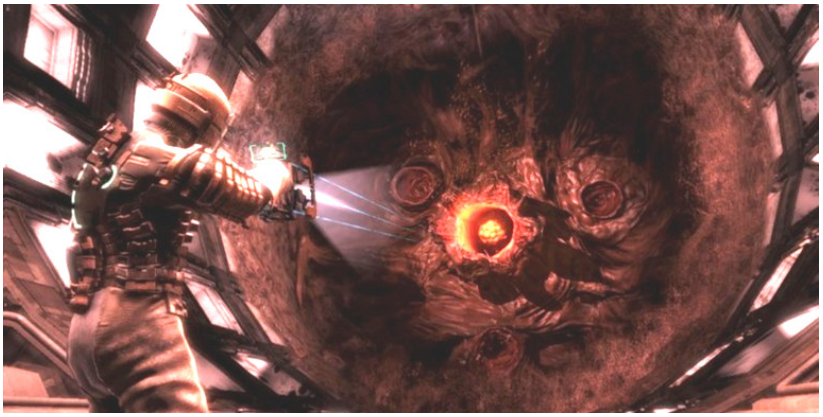

Figure 12-2: Dead Space

The aspect of details that contributes to flow is that they must be balanced as well, especially in their complexity, obviousness, and interactivity. Details as described by Adams deal more with the level of detail in the video game, rather than the architectural details and ornaments presented.

> Include as much detail as you can to help the game's immersiveness, up to the point at which it begins to harm the gameplay. If the player must struggle to look after everything you've given him, the game probably has too much detail.[72]

Games like *Team Fortress 2* (Figure 12-4) can be very simple and stylized, offering very little detail, but are still visually appealing. The *Crysis* series on the other hand, strives for photorealism, down to rendering each blade of grass (Figure 12-3). While the game is undoubtedly beautiful, many have stated that scenes become so detailed that it almost muddies the landscape, and thus interferes with gameplay. Some players may want to stare at the landscape, but in turn, get shot in the head. In an architectural context, Adams describes detail and ornament as "cultural context" and "physical surroundings". Overall, Adams uses these terms to emphasize the need for a realistic and consistent aesthetic to hold a game world together.

Figure 12-3: Crysis 2

[72] Adams 2010, 99

Figure 12-4: Team Fortress 2

Interactive details that function within the gameplay of video game such as doors and moving platforms also play a role in the flow of the game. The most basic interactive detail in a video game is the button. The player interacts with a button and there is a resultant action. Essentially, every interactive detail in a game is in fact a button. For example, a big red button is pressed, and a light turns on. However, a door handle, lever, or a winch that is turned that opens a gate could also be a button. The key to a good button design is making the button obvious and plausible to the player, while not seeming overtly flashy or unrealistic. A big red nuclear launch button (Figure 12-5) is obvious but is still feasible in the established world, a large valve to start a train, hidden amongst a panel of other controls, is not (Figure 12-6). A detail in a game must speak to our preconceived notions of how the world works, in order for them to be evident. In terms of flow, these details meet much of the criteria to create a flow experience. Good interactive details create clear goals, provide immediate feedback, and generally assist the player in reaching an autotelic experience.

Figure 12-5: Half-life 2, button

Figure 12-6: Max Payne, subway valve

In both situations of the interactive and static detail, video games allow for the creation of details that do not, or may never, exist in the physical world. Video game designers are constantly trying to find new ways to make doors, buttons, and other interactive details interesting to the player. Some doors are activated by painting a glyph on to them (Figure 12-7). Some mechanisms require an orb of energy to be placed into a socket (Figure 12-8). Some environments are made of organic life forms that react to the user (Figure 12-9). In the magic circle, these

mechanisms are acceptable and allow for fantastic dynamics to exist. However, the important part about these fictional details is that they still must be based on an established set of rules in order to be feasible and not hinder the immersion.

Figure 12-7: The Void

Figure 12-8: Half-Life 2

Figure 12-9: Prey

The game *Portal* by Valve Software is an excellent case study in the design of fictional environments using details. In *Portal* the player is a test subject at the Aperture Science Lab testing the Aperture Science Handheld Portal Device, or Portal Gun. Using the Portal Gun, the player's character, Chell, must complete tasks in various test chambers, essentially getting from point A to point B each time. Throughout the game, you are alone, but guided by a robotic artificial intelligence voice that explains techniques and objectives in each chamber. The eventual goal is to escape the facility entirely, as the lab's artificial intelligence goes haywire.

The Portal Gun functions using your two mouse buttons. One button creates an orange portal on any non-metallic surface, while the other creates a blue portal on another surface. Moving through the orange portal will let the player exit through the blue portal. The portals also create a visible link, showing the view out of the corresponding portal (Figure 12-10). Objects, such as weighted cubes, can be lifted by the gun and transported through the portals to be placed on giant red buttons in order to activate locked doors. The use of portals allows for infinite possibilities in game design, allowing the designer to place the character in a variety of challenging situations.

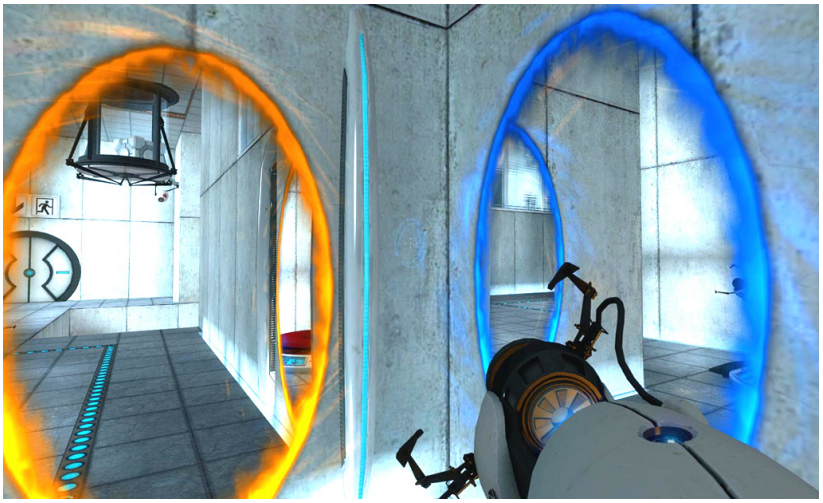

Figure 12-10: Portals

Aside from its innovative gameplay mechanics, *Portal* is also noted for its clean, minimalist aesthetic and details. Surfaces are simple formed concrete, frosted glass, and metal panel. The gun itself is reminiscent of Apple's clean, white devices, as are the enemies faced in the game. While the look is interesting and appealing, its origins are more technical than aesthetic. The original theme of *Portal* was medieval fantasy, where the player used magic to create the portals. As game designer Kim Swift explains:

> We were working with complex environments way back when, but that was the wrong idea for Portal. Because we're introducing a new concept, it was best to keep it bare bones. In one section, all you were supposed to do was put a box on a button and open a door. One player literally spent 30 minutes trying to push a shelf onto the button, meanwhile, the box was sitting right there. That's how the clinical test-chamber environment came to be.[73]

Portal's simple designs allow for players to quickly learn these new concepts. A player can quickly determine that concrete walls and tiled floors are appropriate surfaces to create portals, while glass and black metal panels are not. This palette then generates an aesthetic that is congruent to its function as a sterile lab. Although the concept of the game is pure science fiction, the details allow for the fantastic concepts to thrive. The Portal Gun is a potentially god-like tool allowing for the

[73] Elliot 2008

transport to any location. However, given the rules set out by the details of the game, the reality is grounded. Each texture, colour, light, and form provides a distinct language in order for the world to be understood (Figure 12-12). The details in the game ensure that the player has a consistent and enjoyable experience, by both maintaining the magic circle and supporting the flow experience.

Figure 12-11: Portal, test chamber

Figure 12-12: A Half-life 2 prison level, pre and post-detailing

13 | SPATIAL CASE STUDIES

The following case studies are intended to provide examples of various game spaces in FPS and TPS games that demonstrate the transformation of implied space in the magic circle, and the specific spatial designs used to generate flow experience. Much like the introductory study of Hide-and-Seek, these case studies will analyze game spaces is various stages. First, there will be an analysis of the implied concept of the space compared to the space generated by the magic circle. Secondly the spaces will be analyzed under the paradigm of flow. Spaces are dissected into the dimensions of flow developed in the previous section. These case studies offer examples of the dimensions of flow as they are organized into a whole matrix.

The choice of video games relates to the diversity of the gameplay and narrative of the games, and how those elements create distinct spatial organizations that are generated by the magic circle and the intention of flow. *Half-Life 2: Episode One* represents a space created by an intense linear narrative. The multi-player map of *Call of Duty: Black Ops* demonstrates non-linear, frantic hunting gameplay in space. The cities of *Assassin's Creed* show how extremely non-linear, open gameplay can still be governed and supported by space. Finally, *Portal* demonstrates space created by extremely innovative and physically impossible gameplay elements. The case studies observe only portions of the games that exemplify important spatial aspects of the overall game.

Each study refers to the games' official strategy guides for direct descriptions of the game maps and how the game is played. Many of the case studies also use designer commentary gathered from official behind-the-scenes books and game design interviews. As a whole, these case studies aim to provide a general overview of a variety video game spaces that are spatially governed by the rules of the game, but are also designed specifically to support those rules to create a fun experience.

13.1 | HALF-LIFE 2: EPISODE ONE, URBAN FLIGHT MAP 12

Figure 13-1: Battling aliens in the streets of City 17

Half-Life 2: Episode One is an add-on chapter to the original story-based first person shooter Half–Life 2, which continues the story after the player destroys the Citadel.

> Stepping into the hazard suit of Dr. Gordon Freeman, you face the immediate repercussions of your actions in City 17 and the Citadel. Rejoin Alyx Vance and her robot, Dog, to once again aid the human resistance in their desperate battle against the totalitarian alien menace of the Combine.[74]

Figure 13-2: Your AI partner, Alyx, watches as the Citadel decays

[74] Valve 2009

The original *Half-Life* (*HL*) and its subsequent sequel *Half-Life* 2 (*HL2*) and episodes are an example of classic first-person shooting action with the addition of riveting narrative. The spaces in the *HL* series are conceptually quite simple, consisting of warehouses, offices, cities, and natural landscapes. In a story, these places serve as settings in the plot. However in a video game like *HL*, these settings become pivotal parts of the game experience and must be just as thoughtfully conceived as the characters and dialogue in a narrative. Designers script spaces for balanced pacing and challenge, as well as emotional impact (Figure 13-3).

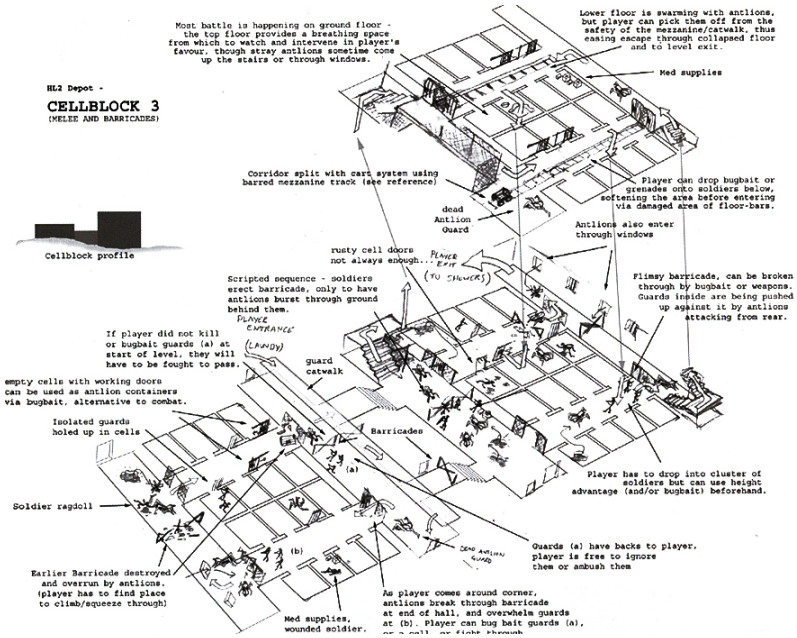

Figure 13-3: Half-Life 2 schematic design by Eric Kirchmer

13.1.1 | MAGIC CIRCLE

Figure 13-4: "Soviet Map of City 17" by Michael Long

As mentioned before, the *Half-Life 2* story takes place in the fictional Eastern European city of City 17. The image above was created by a fan of the game, and demonstrates the conceptual scope of City 17 (Figure 13-4). It is meant to feel like a real city under the oppression of a totalitarian alien force. However, the actual spaces in the game are quite limited, creating specific paths that correlate to the narrative. This case study examines a chapter in *Episode One* entitled "Urban Flight". Since the gameplay and narrative dictates that the protagonist, Gordon Freeman, cannot drive a car or pilot an aircraft at the time, or has any super human powers, he must move through the ruins of City 17 as set by the game design.

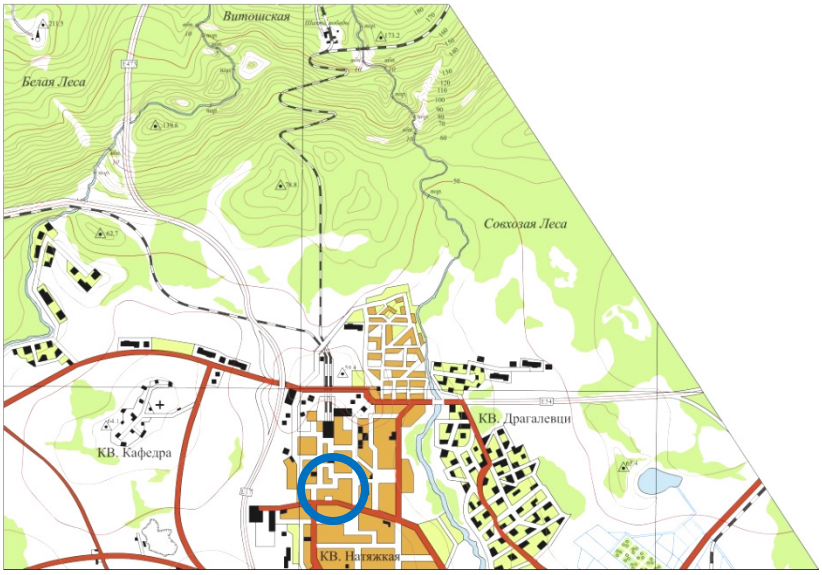

Figure 13-5: "City 17 Episodes Subset", Map 10 noted, by Michael Long

Episode One takes place in the northern reaches of City 17, and "Urban Flight" takes place within about a block of streets and a few buildings (Figure 13-6). From the official game guide:

> Escape the city before the core reactor blows. This is easier said than done, but it isn't impossible. There are hardships to endure, such as the rambling that Doctor Kleiner is forcing the remaining pockets of humans to listen to. Head across the city, employing your Antlion burrow covering technique, and take down squads of Combine still attempting to restore order. They aren't having much luck, but the streets are still filled with them, and other dangers such as Zombines. Continue street by street, paying special attention to your nimble combat prowess when a rampaging Antlion Guard spots you, then proceed to the center of the city sector where Barney Calhoun is leading humanity's remnants to the train station.[75]

[75] Hodgson, Stratton and Lopez 2007, 106

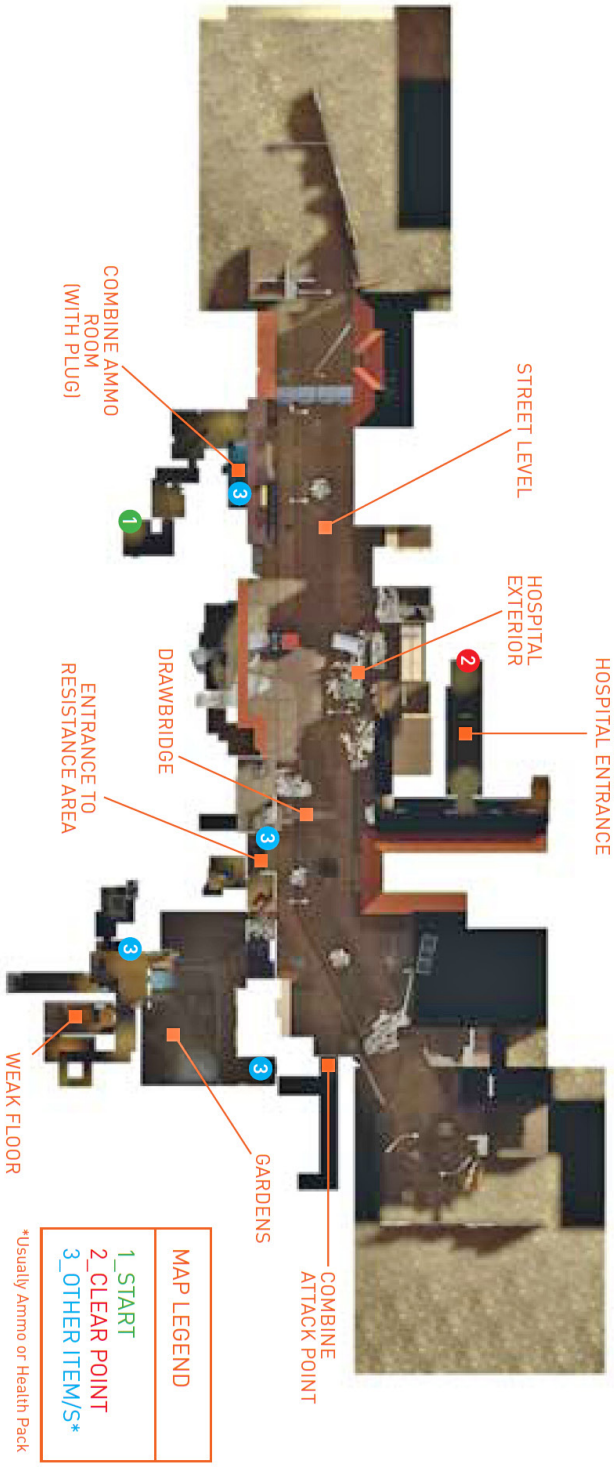

Figure 13-6: Urban Flight, Map 12, from the official strategy guide

"Map 12" is the first portion of "Urban Flight", and is described as the "Tenement Block and Hospital Exterior."[76] The magic circle transforms a series of buildings and streets into a space of narrative gameplay. Faces of buildings essentially become walls of an urban valley that siphon the player through the spatial narrative. Mechanical vent shafts become labyrinthine tunnels that twist the path of the player. As *Half-Life 2* designer Viktor Antonov describes:

> We wanted to go beyond the surface and the facades of the city, so we constructed it from its skeleton – the boulevards, the avenues, and the hidden spaces, like the courtyard on this location shot. Such secret spaces make up a lot of what you don't see when you're visiting a city. We wanted a sense of depth in our world.[77]

Figure 13-7: Half-Life 2, location shot

Given that the characters in the game are usually on the run, the "hidden spaces" of the city become the main paths of movement, opposed to open sidewalks and roads. The magic circle of the game allows these hidden spaces to be the primary means of travel, and supports a different iteration of urban space (Figure 13-8).

[76] Ibid 116

[77] Valve 2004, 186

Figure 13-8: A tenement courtyard in Episode One

13.1.1 | FLOW

The goal of *Episode One* is the almost the opposite of the original *HL2*. Instead of heading towards the Citadel, Gordon Freeman and his companions must escape City 17 as the Citadel is about to implode (Figure 13-9).

Figure 13-9: The decaying Citadel

While the Citadel serves as a general spatial landmark for the game, the spaces in *HL2* are generally more defined by their barriers, paths, and enclosures. Due to the emphasis of story in the game, most of the motivation for the player comes from the narrative, but is still supported by space.

Figure 13-10: Map 12 at ground level

Due to the linear nature of the game, the enclosures of the maps are usually tight paths that guide the player from point to point. While playing, the players feel like they are in a fully realized city (Figure 13-10). However, using the “noclip” function in the developer’s console to fly above the map, it is clear that basic environment is a valley that guides the player (Figure 13-11).

Figure 13-11: Map 12, above using "noclip"

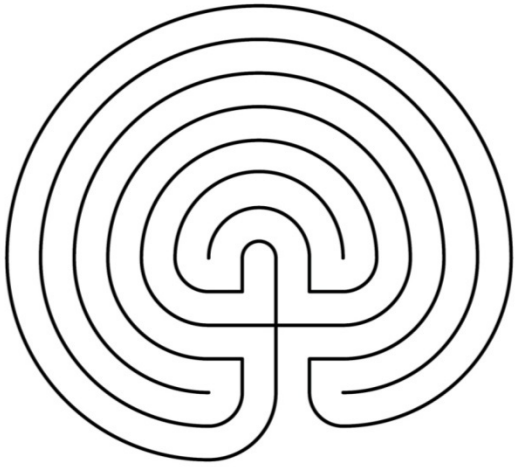

Figure 13-12: A classical labyrinth

The basic spatial enclosure of "Map 12" is a labyrinth. Herman Kern, arguably the world's foremost expert on labyrinth research, defined the labyrinth as such:

> Its round or rectangular shape makes sense only when viewed from above, like the ground plan of a building. Seen as such, the lines appear as delineating walls and the space between them as a path, the legendary "thread of Ariadne". The walls themselves are unimportant. Their sole function is to mark a path, to define choreographically, as it were, the fixed pattern of movement. The path begins at a small opening in the perimeter and leads to the center by wending its way in circuitous fashion across the entire labyrinth. As opposed to a maze, the labyrinth's path is not intersected by both paths. There are no choices to be made, and the path inevitably leads to, and ends at, the center. Accordingly, the only dead end in a labyrinth is at its center. Once there, the walker must turn around and retrace the same path to return outside.[78]

One of the main ideas, spatially, about the labyrinth is that it delays a single path of travel to the point of destination, without intersecting with previous paths. This system has been referred to as a "unicursal" design. Games like *HL2* utilize the guiding nature of the labyrinth to create spatial challenge, but naturally set clear goals through its structure.

[78] Kern 2000

Within a limited footprint, the Map 12 is designed to create the longest most challenging path to the intended goal. At the beginning of the map, the character encounters a locked door.

Figure 13-13: The locked door of Map 12

In order to get to the other side of the door, as well as unlock it for the player's companion, the player must enter a winding maze of air ducts that link together a series of rooms riddled with traps.

Figure 13-14: Vent entry

Figure 13-15: Inside the vents of Map 12

Figure 13-16: Room with trip mines and barrels of gas

After nimbly, evading a series of laser triggered mines, the player enters an elevator that quickly plummets into a flooded shaft. Once they have escaped from the cab, the player must move up the shaft (Figure 13-17), moving to another room and through another series of air vents (Figure 13-20), and then finally to the other side of the beginning door allowing for the player's partner, Alyx, to enter (Figure 13-22).

Figure 13-17: The elevator shaft of Map 12

Figure 13-18: A room cleared of traps in Map 12

Figure 13-19: Another vent entry in Map 12

Figure 13-20: Climbing a vent in Map 12

Figure 13-21: The final drop into the lock room of Map 12

Figure 13-22: The other side of the locked door in Map 12

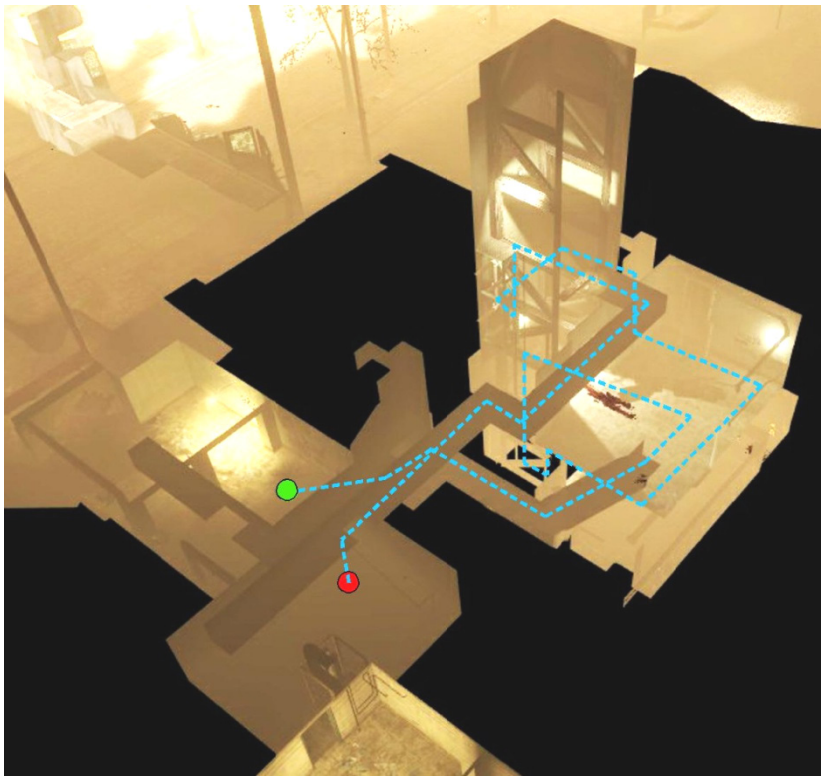

Figure 13-23: Map 12 start sequence path in perspective

Again, using the "noclip" function of the game, it is clear that the beginning sequence of Map 12 is labyrinthine in nature (Figure 13-23). The start and end points are literally adjacent to each other, yet the spatial organization requires the player to take a long winding path. However, not every space is a true labyrinth, as that would imply that a traveler can move backwards and return to the start. To ensure that the player is constantly moving forward, the designers employ three dimensional dead ends, such as ledges and drops, so that the player cannot move backwards even if they wanted to (Figure 13-24). The overall spatial structure of the maps is still of labyrinthine circulation that balances the challenge of moving through space equally with the guidance of space. For most players and game designers, the *Half-Life* series is still the blueprint for most story driven first person games.

Figure 13-24: Example of a dead-end "drop"

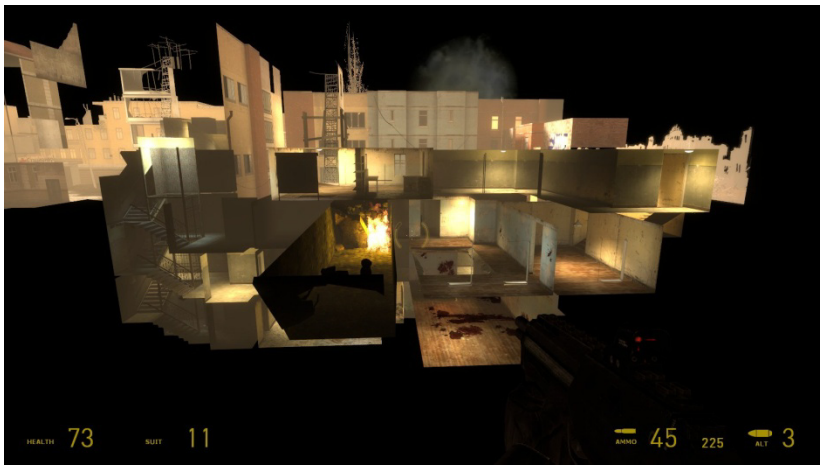

Figure 13-25: The final sequence of Map 12 in “noclip” mode

13.2 | CALL OF DUTY: BLACK OPS: NUKETOWN

Figure 13-26: Call of Duty: Black Ops, multi-player

Call of Duty: Black Ops is one the best selling games of all-time at the time of this writing, exceeding $1 billion in worldwide revenue. *Black Ops* is a first person military shooter featuring a single-player campaign that puts the player in the boots of an American soldier in various semi-fictional conflicts during the Cold War. The multi-player portion of the game consists of a variety of self contained maps using some of the locales found in the single-player game. In these environments, players essentially run around and attempt to eliminate as many players as possible, as a team or an individual, until the score or time limit is reached.

Figure 13-27: Call of Duty: Black Ops, single-player

Figure 13-28: Nuketown's cul-de-sac

> There isn't much to Nuketown. It's a very simple level, so expect short and vicious firefights no matter which mode you play. There's a decent amount of cover, so it forces you to fight a mobile close quarters combat style. You may find this highly enjoyable of extremely challenging depending on your mindset![79]

Nuketown is arguably the most popular map in the multi-player game, with servers that only play this map 24/7. Stylistically, the map is designed to resemble a mock-up of an American 1950's suburban cul-de-sac used to test the effects of nuclear bombs (Figure 13-28).

Figure 13-29: Nuketown, aerial view

[79] Denick, Marcus and Snipers 2010, 269

13.2.1 | MAGIC CIRCLE

Figure 13-30: Nuketown in plan

As an architectural format, the general layout of Nuketown is that of simple residential neighbourhood (Figure 13-30). Beyond the fences of the compound is an infinite desert landscape. The concept of a neighbourhood as a playground is ripe for gameplay. Houses provide safety and hiding. Upper floors provide vantage points to survey positions. Backyards, lawns, and streets allow for stretches of running and acrobatics. Fences create natural boundaries. As a whole the suburban neighbourhood is a complex play-ground.

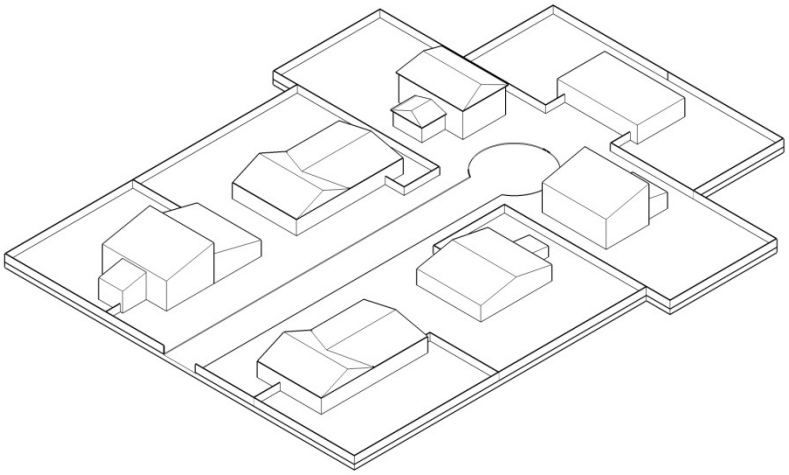

Figure 13-31: Nuketown's overall organization

Once gameplay is applied, the site becomes tighter and more complex. Given the limitations set on the players jumping height, the map is condensed to three houses surrounding a cul-de-sac, and bound by fences. Since the player cannot jump over fences, or drive the stationary cars, the game is limited to this magic circle. Only the two parallel houses can be entered and used as cover (Figure 13-32). Gameplay modes include: deathmatch, team deathmatch, domination and capture the flag.

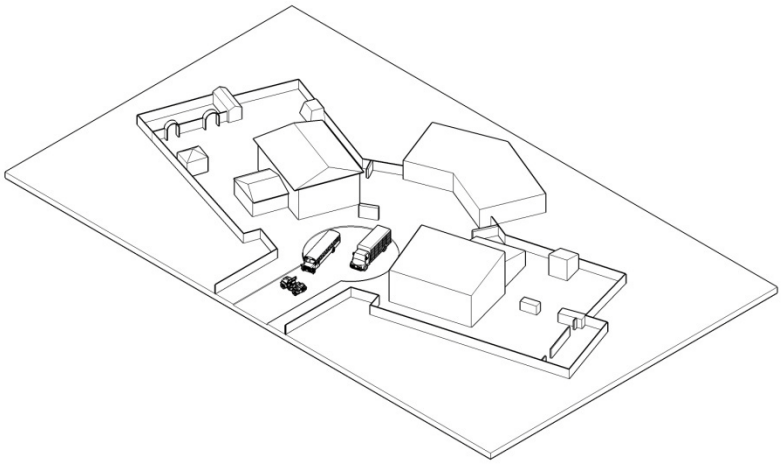

Figure 13-32: Nuketown's "magic circle"

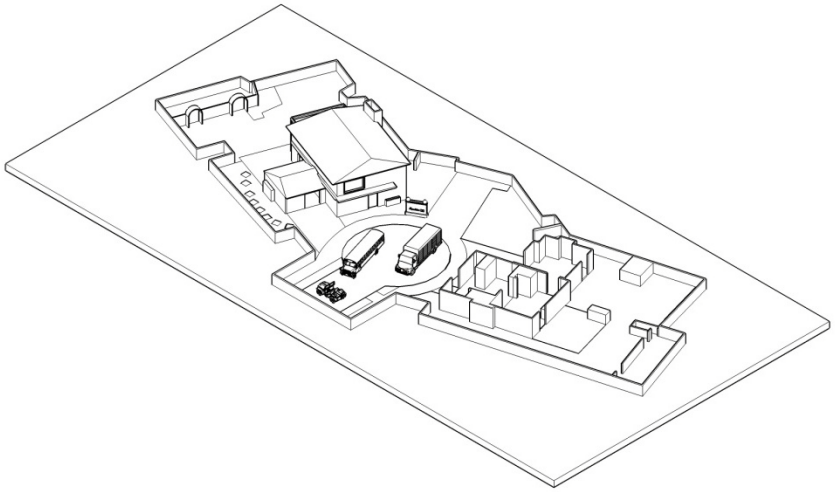

Figure 13-33: Nuketown in detail

This case study examines Nuketown under the specific game mode of capture the flag. The goal of capture the flag (CTF) is to retrieve the facing team's flag from their base and return it to your own. Each flag captured is a point and the game is won for the first team to reach 3 points. A point cannot be gained if the flag has been stolen and is not at the base. Flags can be dropped by killing flag carriers and touching the dropped flag returns it to base, but can also be recaptured. Supporting players can escort flag runners and defend flag bases. The simplest layout for this game mode would be a field with a flag on each end. However to challenge players, obstacles are usually placed in the way to provide both hiding for flag carriers to stay safe and defenders to ambush attackers, or vice versa (Figure 13-33). Given these spatial elements of CTF, the simple suburban concept of Nuketown becomes the perfect conditions for this game mode. While the concept and image of the space implies a home or place of rest, the rules enforced in the magic circle turn the cul-de-sac into series of obstacles and challenges for the player.

13.2.2 / FLOW

> …the primary two rules of level design are you should always be able to see your exit when you enter a room, and paths in [it, sic] should lead players to collide.[80]

These are the main rules of multi-player map design stated by *Black Ops* senior level designer Phil Tasker. The main aspect of Nuketown's effectiveness as a CTF multi-player map is a spatial organization that follows these rules. The map utilizes various barriers and obstacles (cleverly disguised as suburban artifacts) to obstruct clear sight lines from across the map, spatially instigating exploration in order to find others, opposed to standing back and sniping. However, within each area of the map, there are a clear number of options to move to a new area. Barriers, taking the form of hedges, sheds, and automobiles are staggered across the map, forcing players to quickly turn corners, often resulting in a mini shootout. Once the pattern of use is learned, players begin to note spots of high intensity and often rush towards them, in hopes of catching a group off guard. The side paths leading from backyards to the front lawn become bottlenecks of activity. The overall composition of the map relies on the staggering layout of baffles resembling W.F. Jackson Knight's description of ancient Egyptian tactical labyrinths:

> They have a system of walls with openings not opposite to each other but staggered, so that attackers have to take a long crooked path, moving laterally between the opening in one wall and the opening in the next. The plan enforces a labyrinthine path, and therefore achieves the correlative principles of conditional exclusion and conditional penetration. Friendly troops can freely use the path of entry; but an enemy, under enfilading fire for a long distance, is severely obstructed.[81]

Similar to the parallel walls of the Sonsbeek Pavilion, Nuketown uses staggering sight lines to create surprise and chance encounters for players moving through the space (Figure 13-34).

[80] oneofswords 2011

[81] Bord 1976, 11

The following plans and accompanying images break down the spatial dimensions of flow present in Nuketown.

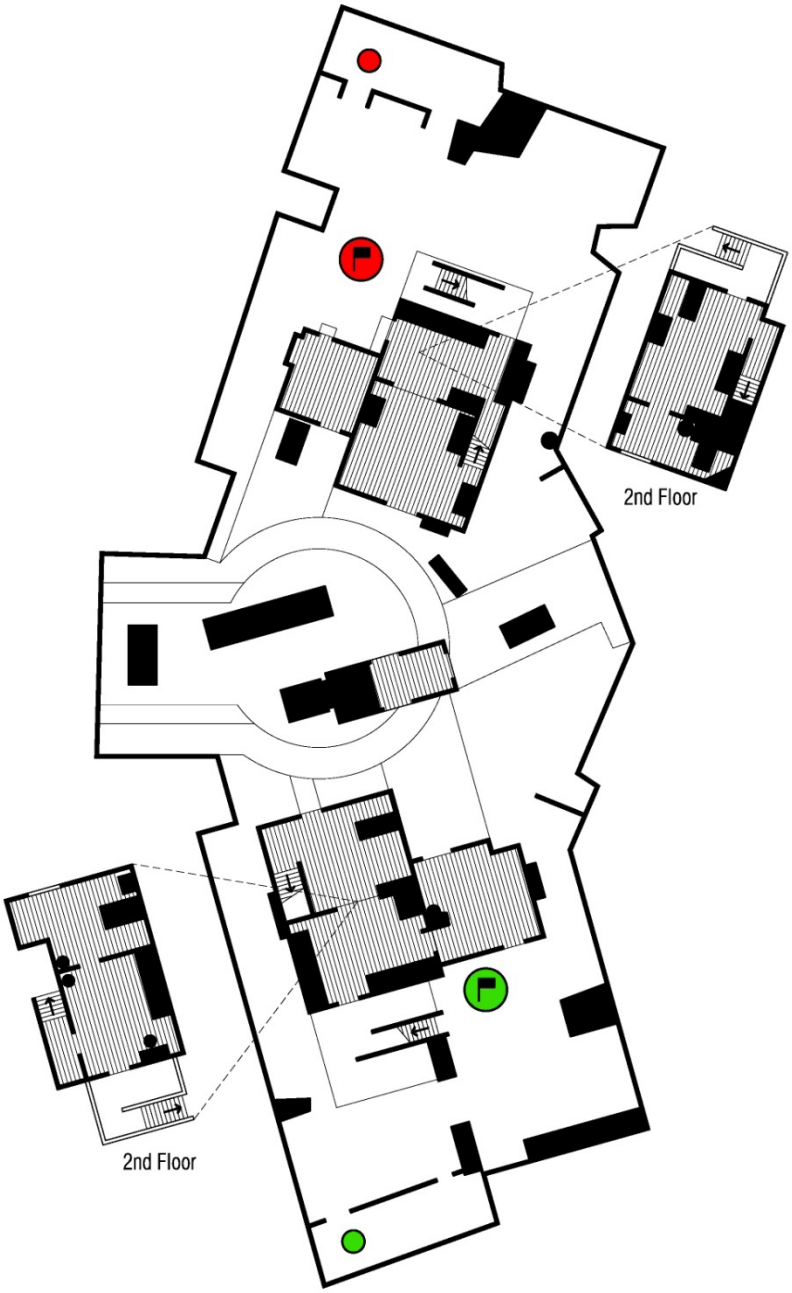

Figure 13-34: Nuketown, Plan, N.T.S.

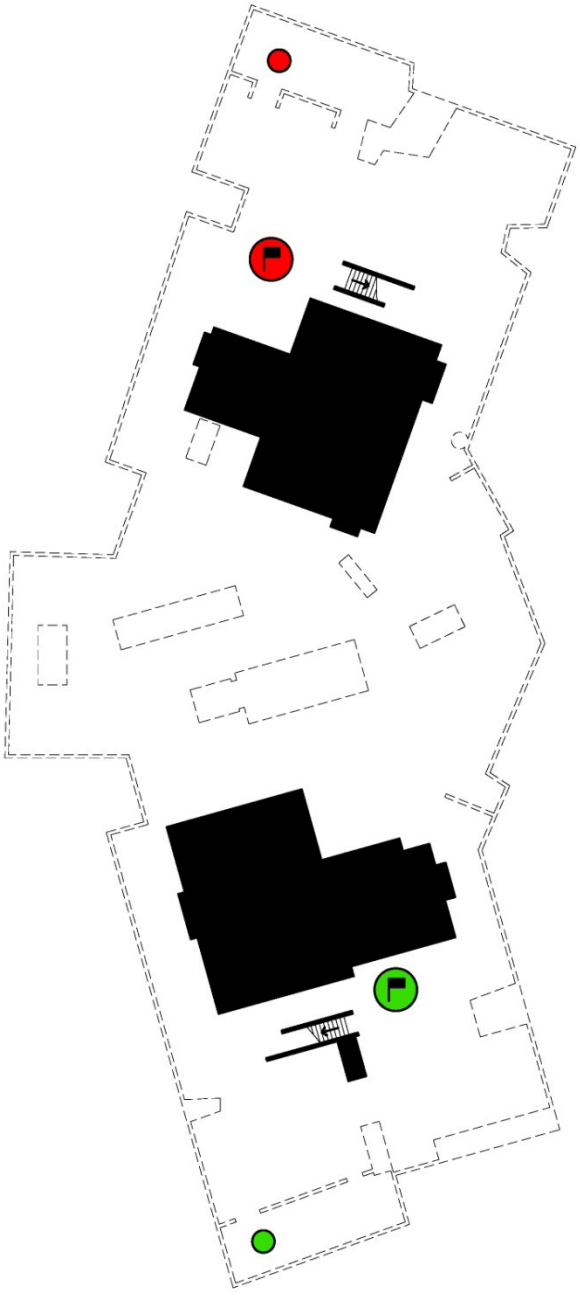

Figure 13-35: Nuketown, Houses as nodes

Figure 13-36: The "green house"

Figure 13-37: The "yellow house"

The two main nodes of Nuketown are the two facing houses (Figure 13-35). Depending on the player's spawn point, each house can act as both a starting point and destination in a game. The opposing house notifies the location of the enemy's flag, while the team's house acts as protection for their flag (Figure 13-38). Within the L-shaped layouts of the houses are a series of cells that acts as a buffer for incoming enemies aiding in the defense of the team's flag (Figure 13-39). Each house also has a second floor with two rooms: one with a window looking on to the cul-de-sac, and another leading to a balcony and stair to the backyard (Figure 13-36). While a view over the main field of play may seem unfair, most of the vehicles obstruct clear shots (Figure 13-43). The higher plane also puts the player in a spot of vulnerability as they are visible over the cars (Figure 13-44). Furthermore, the symmetrical houses mean that players can snipe from window to window.

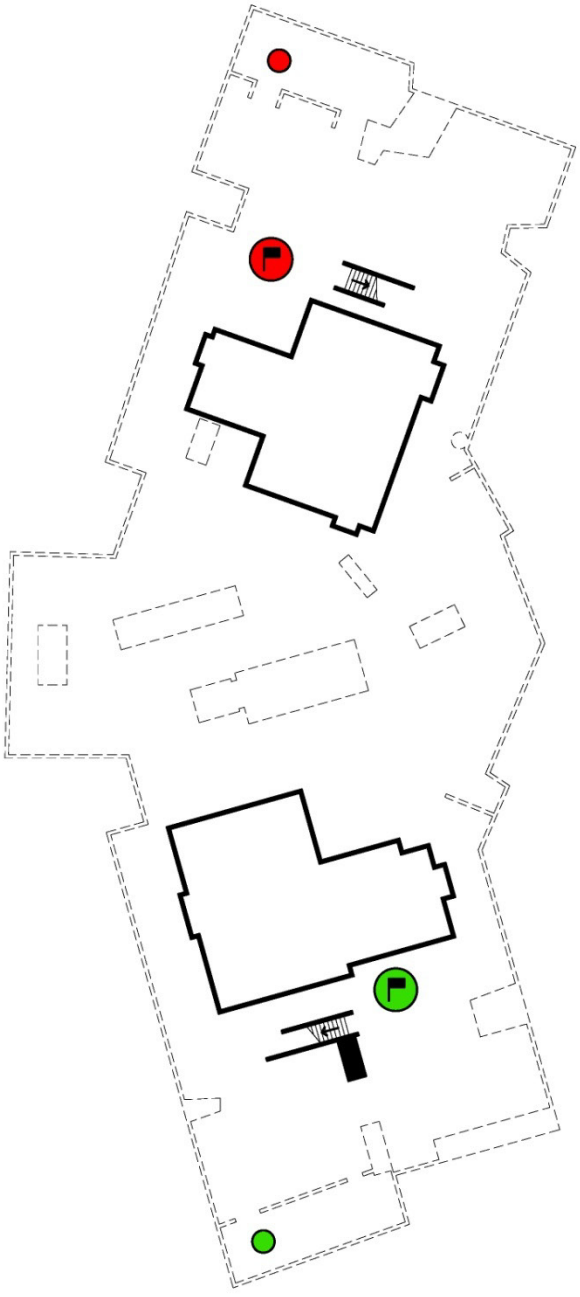

Figure 13-38: Nuketown, House boundaries

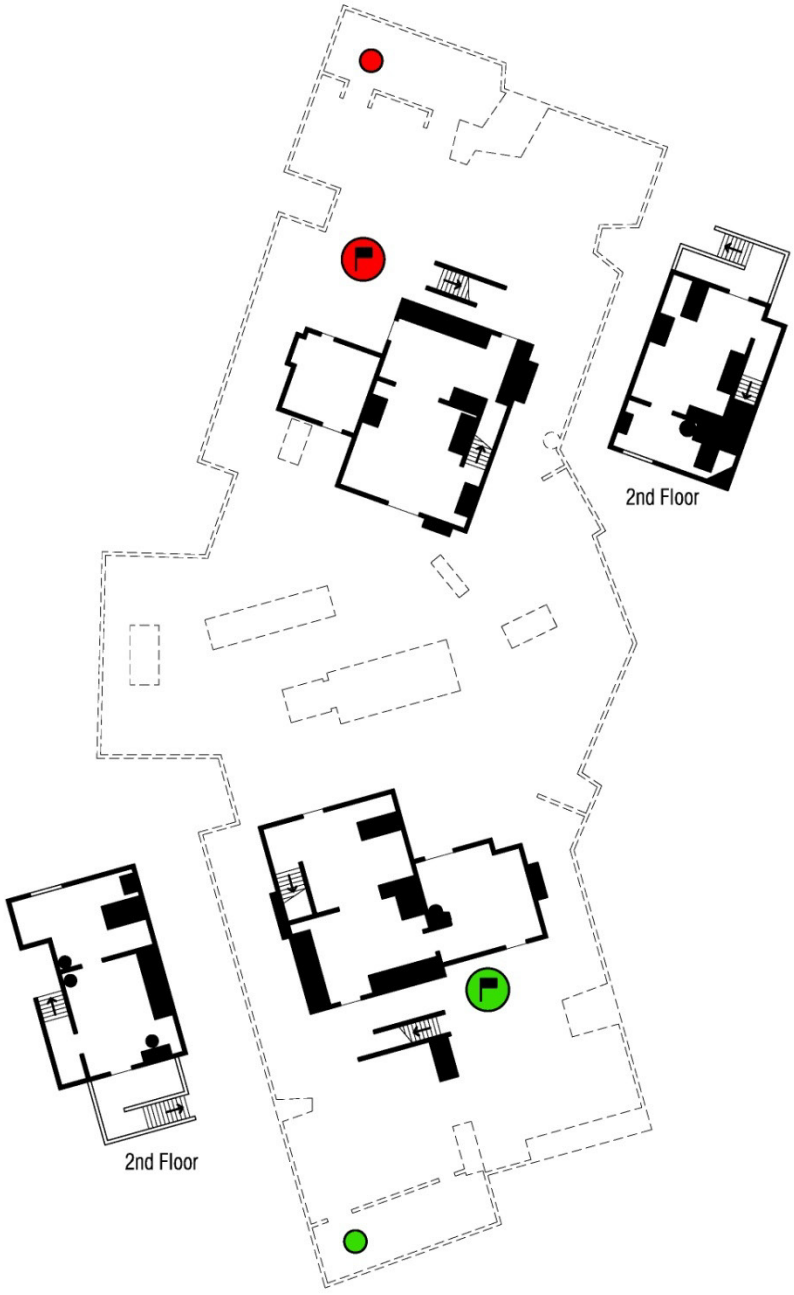

Figure 13-39: Nuketown, house cells

Figure 13-40: A Nuketown garage

Figure 13-41: A Nuketown living room

Figure 13-42: Nuketown kitchens

Figure 13-43: View out from the "green house" window

Figure 13-44: View of the "green house" window from the cul-de-sac

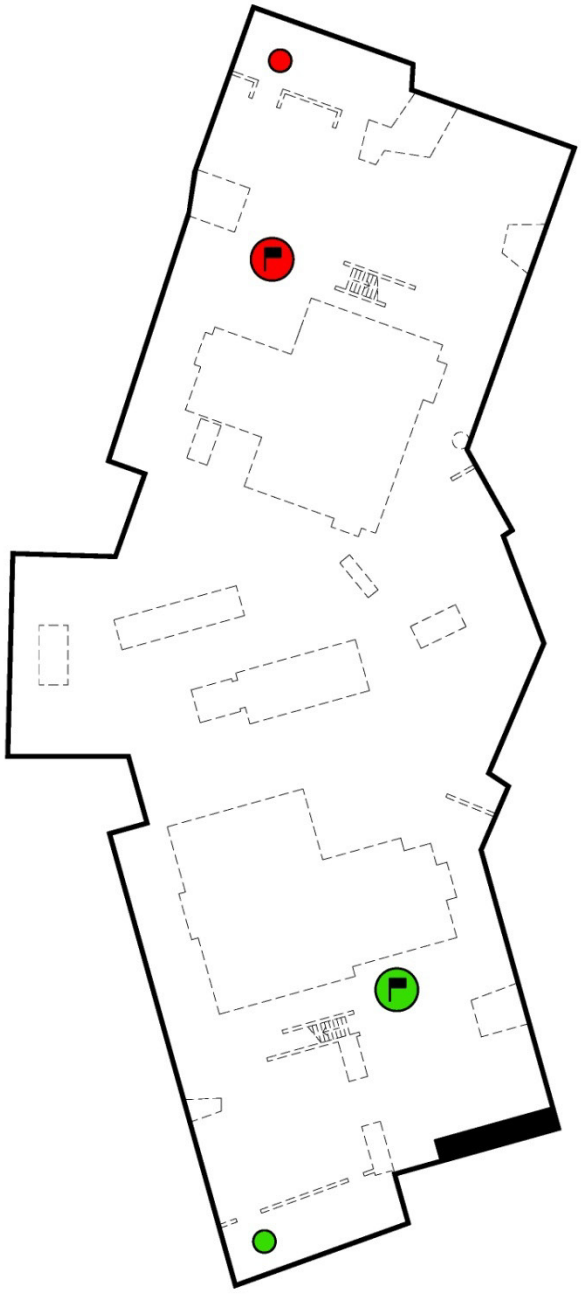

Figure 13-45: Nuketown, enclosure

Figure 13-46: Knifing in Nuketown.

The size of the map may be the main reason for its popularity. With up a maximum of 18 players on the map at a time, it becomes impossible to not bump into someone on the map. Other larger maps in the game offers players a variety of playing styles, including sniping from afar, or hiding in corners, waiting for unsuspecting players to pass and be ambushed (this is known as "camping"). Nuketown, on the other hand, encourages close quarters combat, with players often resorting to combat knifes, opposed to sniper rifles (Figure 13-46). Given the player to space ratio the chances of interaction are fairly high. Below is a "heat map" that can be viewed after a match (Figure 13-47). The red represents the locations of deaths by other players, while the yellow represents the current player's death locations.

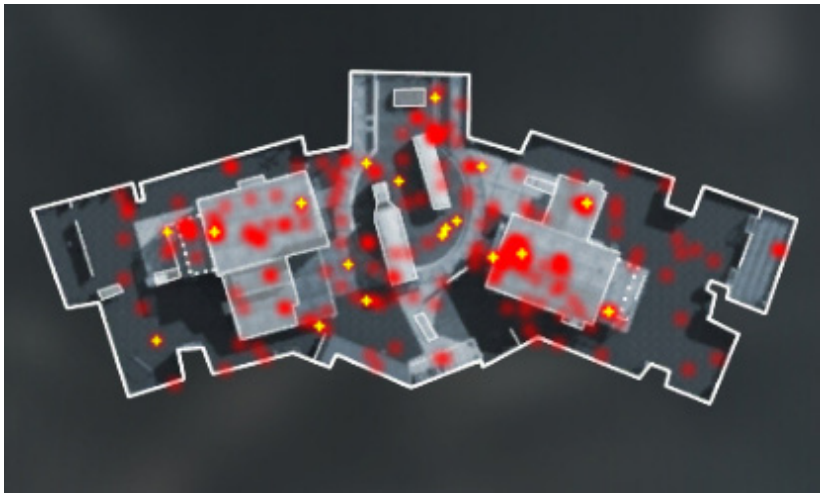

Figure 13-47: Nuketown "heatmap"

The enclosure of the map is also an elbow shape that prevents a clear shot or path through the entire map (Figure 13-45). Its basic function as a tight perimeter is to maintain a high density of players, resulting in high action play.

Figure 13-48: The fences of Nuketown

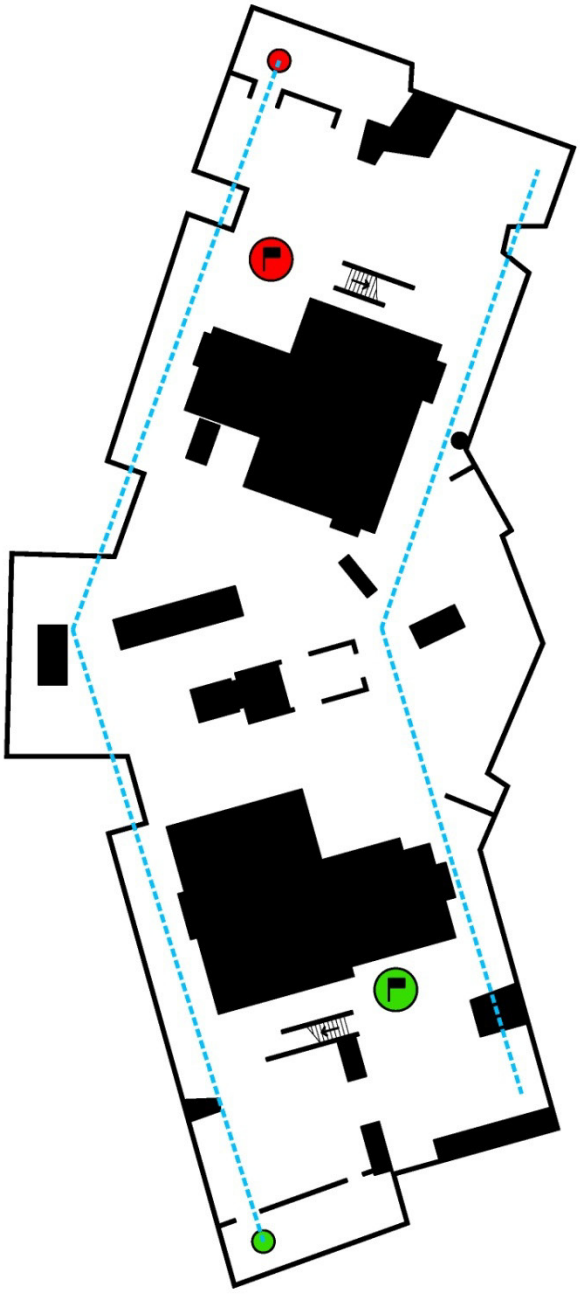

Figure 13-49: Nuketown, perimeter sight-lines

Figure 13-50: Nuketown's sight-lines

The key to the effectiveness of Nuketown's layout is the lack of any clear line of sight over a large distance (Figure 13-49). Due to the density created from this organization, quick turns around corners often lead to face to face encounters with enemies. To many, the number of these encounters compared to larger maps is what challenges players, and brings back players for more.

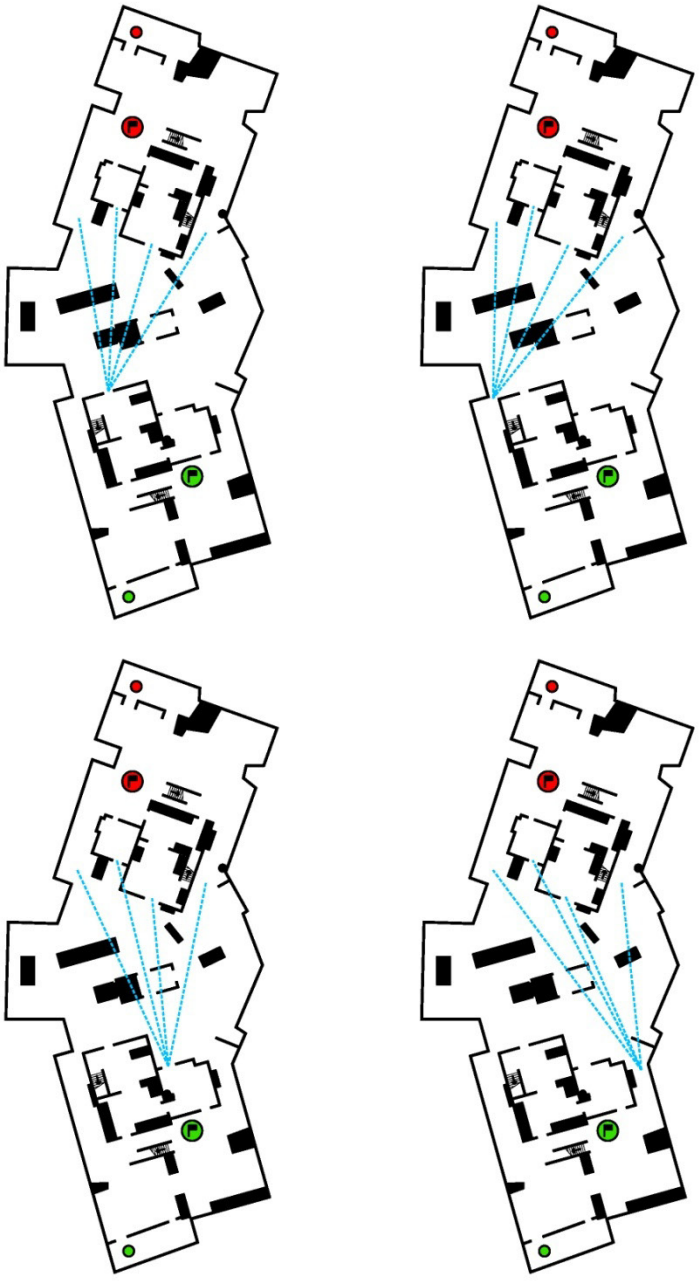

Figure 13-51: Nuketown, sight-lines from the green flag

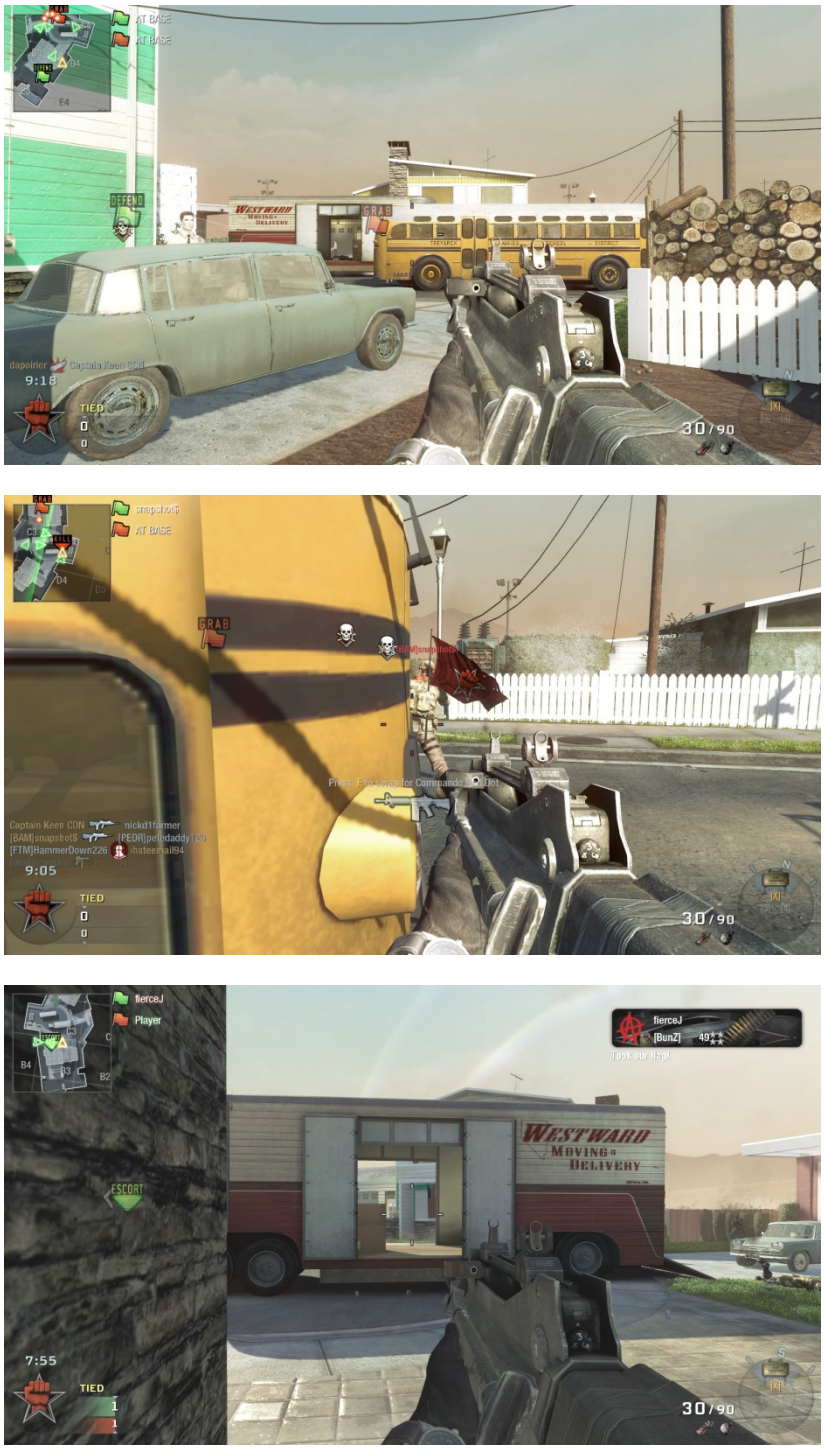

Figure 13-52: Nuketown's staggered car baffles

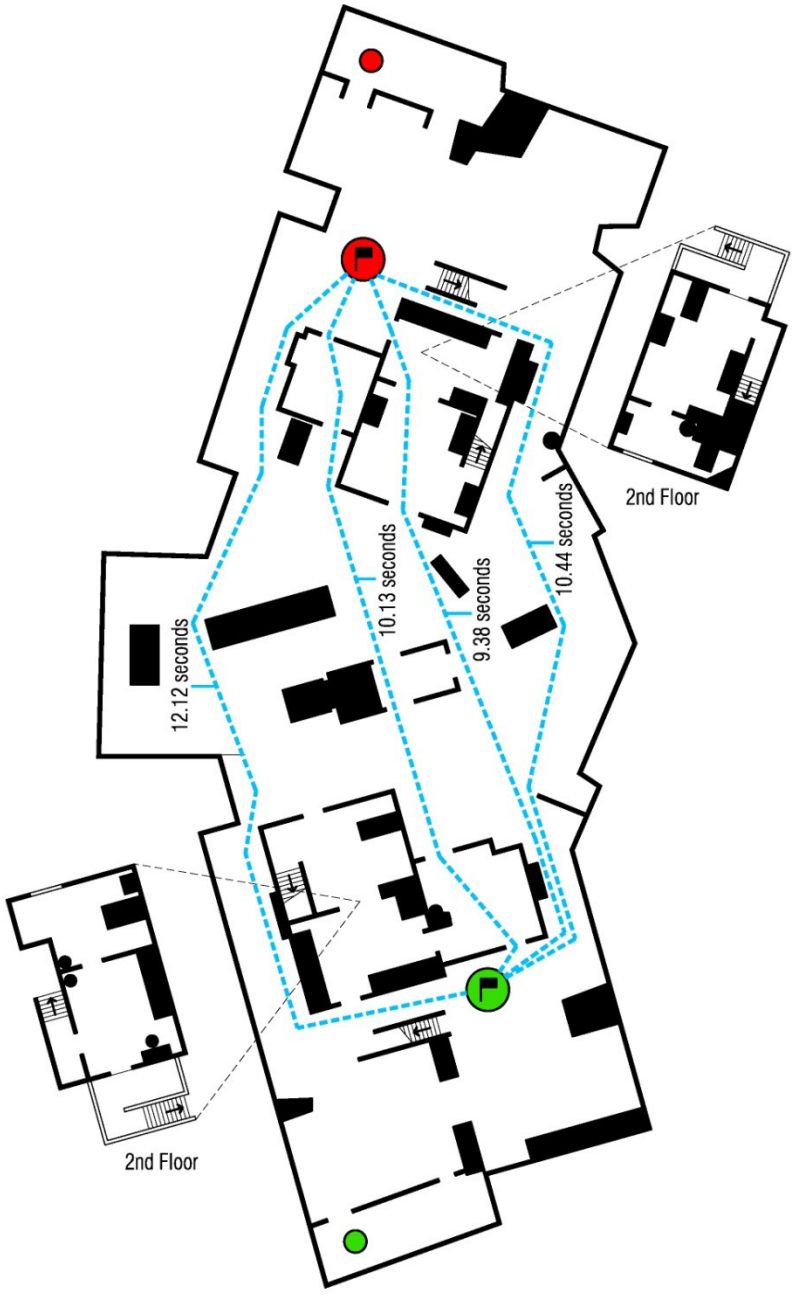

Figure 13-53: Nuketown's fastest runner paths

In terms of gameplay, the spatial organization of Nuketown creates an excellent state of flow. While the player may die frequently, there is equal chance for even a beginner to make a few kills by surprising someone around the corner of the bus or a house. Compared to other maps, there is no clear spot of advantage that players can exploit. As a video game spatial format, is it a small enclosure with a bipolar organization, truncated with staggered obstacles that effectively support the game of CTF.

Figure 13-54: Nuketown Victory and Loss screens

13.3 | ASSASSIN'S CREED: ACRE, RICH DISTRICT

Figure 13-55: Assassin's Creed

In Ubisoft's 2007 third person stealth action game *Assassin's Creed*, the player takes control of a master assassin, Altair, gifted with amazing free-running skills that must assassinate various targets in vast cities during the Third Crusade. While other games at the time, such as *Grand Theft Auto*, had featured large scale interactive cities, *Assassin's Creed* was one of the first to feature the ability to scale walls and travel on the rooftops of a city. *Assassin's Creed* is truly a game of movement, as players must determine the most inconspicuous path towards their target, eliminate them, and then find the quickest escape route. While it is possible to run towards a target at street level and fight out of a situation, it is much harder than the stealthy approach.

Figure 13-56: Altair mid assassination

13.3.1 | MAGIC CIRCLE

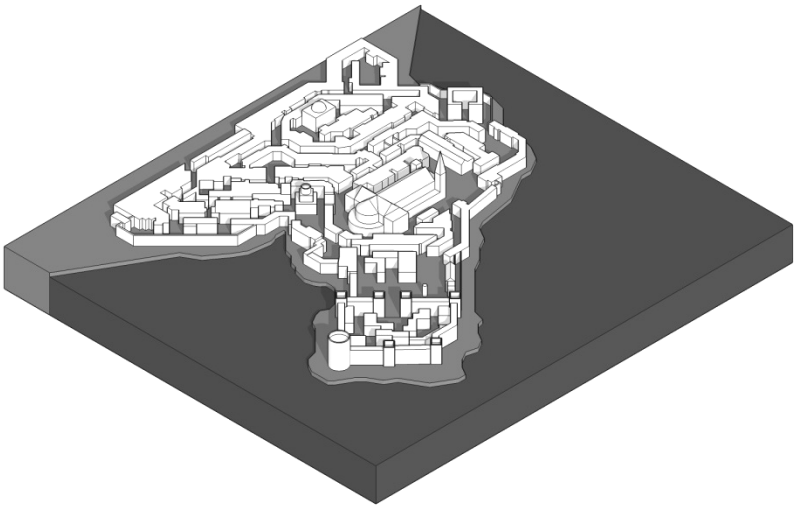

Figure 13-57: Overview of Acre's Rich District

> Boasting two of the largest and most impressive feats of architecture in the known world, Acre's Rich District (also known as the Chain District) is where William of Montferrat holds his power. He is within the walls of his impressive Citadel, which is surrounded on three sides by water. After a large market square has been negotiated, you find Acre's other impressive structure: the Cathedral of the Holy Cross, which boasts the tallest spire in all the Holy Land. To the east is a Hospital where Guards place a particular importance on patrolling. Head north and you're in the main city, with streets filled with so many side alleys it's almost overwhelming. The plan here is to take a chance with the Archers, polish your Throwing Knives, and head across the rooftops.[82]

Acre is based on a real city located in Israel that was captured by the Crusaders during the First Crusade. Its architecture reflects the impact of the Crusades with heavy fortifications and gloomy atmosphere (Figure 13-57). The designers strived to create a living, breathing city that, without the gameplay, could represent an accurate city simulation. However with the addition of gameplay and the new rules set by the abilities of Altair, the city becomes a giant gauntlet of acrobatics.

[82] Hodgson, Knight and Waples 2007, 125

Figure 13-58: View of Acre's rooftops

One of the most inventive gameplay elements of Assassin's Creed is the free-running or "parkour" abilities of Altair (Figure 13-59). In the real world, parkour is a growing sport that involves runners that engage the urban fabric as a series of obstacles, employing acrobatic, climbing, and martial arts techniques to conquer them. In *Space, Time, Play*, writer Lukas Feireiss describes these runners:

> Its practitioners, so-called *traceurs*, strive to overcome obstacles in the built environment in the fastest and most direct manner possible by fluidly adapting their movement to any given spatial restraint.[83]

The parkour element in *Assassin's Creed* is a gameplay mechanic that actually expands the magic circle of a space, rather than condensing it. In the real world, most people are not skilled enough to climb to rooftops and jump from building to building. However, in the game, Altair is able to do this, thus opening the city to a new space of possibility. The rooftops become a secondary plane of movement.

[83] Feireiss 2007

Figure 13-59: Altair free-running

However, Altair is not truly free in his movements. Given that he is an assassin, walking in streets draws attention to him. In plan, streets provide the easiest paths to targets, but are also the slowest. Following the rooftops allows for a more discreet path, but still not the most direct path. Assassin's Creed relies on a mix of both street and roof that defies the common idea of movement through a city. As art director Raphael Lacoste puts it:

> When we arrive on the edge of a cliff and discover a whole city, the impression is of an incredible open space. When we get lost in small crowded streets full of smoke, we are feeling oppressed. If we climb up on the roofs of the city, the feeling is far more liberating. We are mastering our moves, on the top of the living, breathing world.[84]

Through player experimentation, it is quickly established that Altair cannot climb steep natural surfaces, survive great falls, or swim. With these rules in play, the overall boundaries of the game are defined by mountains, valleys, heights, and water.

[84] Hellard 2007

Figure 13-60: Acre's buildings from the ground

Within these natural boundaries, every built structure in the city turns into a possible candidate for climbing, while every gap between them is an opportunity for leaping.

Figure 13-61: Altair leaping between buildings

Figure 13-62: Altair climbing a rose window

Furthermore, the climbing abilities of Altair transform the details on these buildings into a series of grips and ledges for scaling (Figure 13-62). The gameplay as a whole transforms the city of Acre into a play ground for the traceur, Altair.

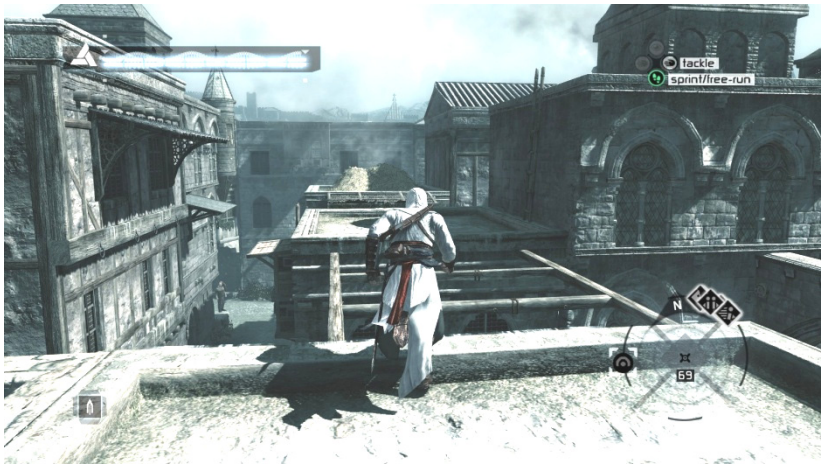

Figure 13-63: Navigating Acre with Altair

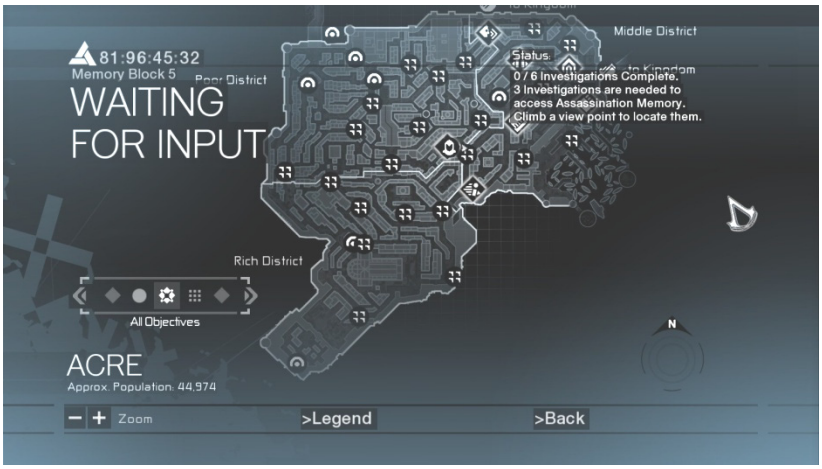

Figure 13-64: In-game map of Acre

13.3.2 / FLOW

Due to the expansive qualities of the city, it is important for points of interest and reference to exist in the spaces of *Assassin's Creed*. Throughout the city are tall buildings and spires that known as "View Points" (Figure 13-65) that can be climbed from rooftops, allowing Altair to view more portions of the city, and adding more information to the in-game map (Figure 13-64). These nodes not only allow for amazing panoramic views (Figure 13-67), but create points of interest, reference, and destination in the games dense urban maps (Figure 13-66). On the ground, courtyards and fortresses become nodes as well. From the official strategy guide:

> The majority of this area consists of interconnected alleyways and slightly larger east-west streets that link adjacent zones. Of particular interest is a converted Mosque to the north, which sports a Crusader spire. This spire is a good way of orienting yourself if you get lost in the maze of streets. There are also two courtyards, one to the west and one to the east; both of them provide interesting opportunities for stealthy killing.[85]

The rooftops are also littered with small huts, known as hiding spots (Figure 13-68). If Altair is being chased by guards, he can jump into one of these spots and hide until the coast is clear. In a frantic chase these spots become welcoming nodes that direct the player's movement. Acre employs nodes in a variety of scales that work with the dynamic gameplay in *Assassin's Creed.*

[85] Hodgson, Knight and Waples 2007, 126

Figure 13-65: Viewpoint locations across Acre

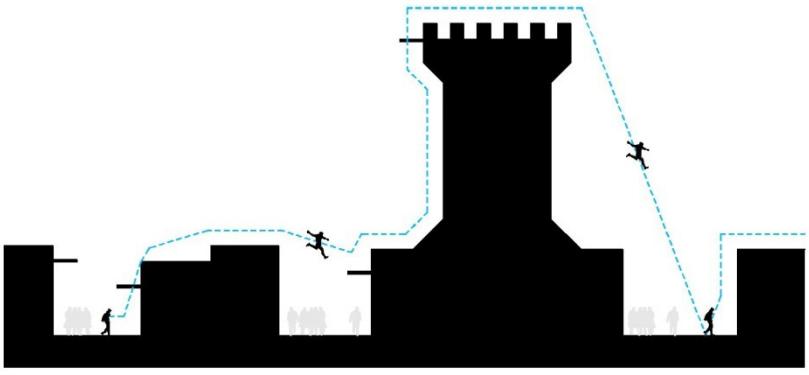

Figure 13-66: Typical Acre section

Figure 13-67: Altair atop the Cathedral of the Holy Cross:

Figure 13-68: Acre rooftop hiding spot

Figure 13-69: Altair overlooking a courtyard

Figure 13-70: Altair in a crowd

Figure 13-71: Acre Rich District ground plane

> 'Assassin's Creed,' like many game productions, is not a linear game play by any means. In other words, an artist didn't work on specific environments for specific paths.[86]

There are no set paths in the cities of the game. Most games employ dead ends to navigate and provide immediate spatial feedback to the player. Since Altair can climb almost any wall, dead ends do not exist, as he can simply scale the surface blocking him. *Assassin's Creed* uses a technique that differs from most games. Instead of dead-ends as a means of feedback, open spaces act in a similar manner. Due to the need for stealth, open spaces become undesired locations that should be avoided or moved through quickly. Courtyards and piazzas leave Altair in the open, with nowhere to climb or run in case he is detected (Figure 13-73). Acre contains both open and tight spaces that let the player know if their actions are effective.

[86] Hellard 2007

Figure 13-72: Acre Rich District roof planes

Figure 13-73: Altair caught on the ground

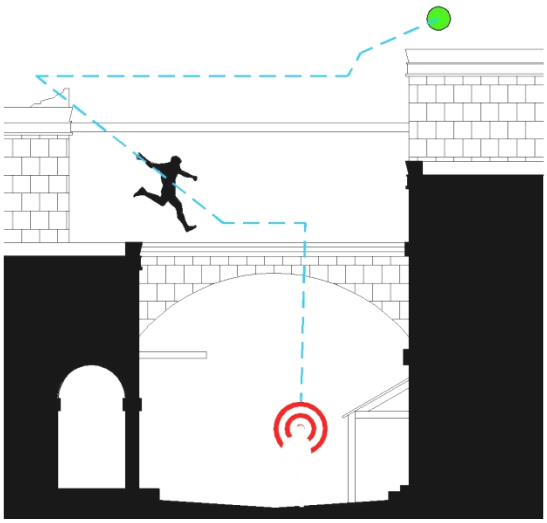

Figure 13-74: A typical means of attack

The cities of *Assassin's Creed* are truly spaces of challenge. Taking cues from the world of parkour, Acre and other cities in the game are designed as huge obstacle courses.

> Even the term *Parkour* is derived from "parcours du combattant," the name of the obstacle used in French military education. Viewed in this context, the city is literally being charged as a potential opponent by the *traceur*.[87]

Assassin's Creed is a game that truly works in three dimensions as your character can scale almost any wall. The abilities of Altair allow for a direct cut through the urban fabric. However, even with your character's skills, the player still must be wary of the height of jumps, and recognize details that allow for grabbing.

> Just watch your step. Falls from these three-story buildings are far less forgiving.[88]

In order to evade patrols, the environment acts as both a help and hindrance to your goals. In a chase, obstacles such spaces between buildings can help Altair lose pursuers, while tall walls requiring time to climb slow the player down, allowing guards to catch up. A chase becomes a game of strategy and understanding the spaces allows for the most effective means of escape.

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[87] Feireiss 2007

[88] Hodgson, Knight and Waples 2007, 127

With the abilities of Altair and set gameplay rules, it would be simple to make the game either very hard or very easy. Too much open space would make Altair vulnerable from attack, while an entire tight rooftop layout would make Altair practically uncatchable. The layout of Acre's Rich District is an example of how *Assassin's Creed* balances its cities to provide both challenge and relief. Targets are usually situated in open spaces that require careful maneuvering and planning (Figure 13-74). Once the target is terminated, a quick escape is needed, and climbing a building and running across the rooftops provides that. The plan fluctuates between tight and open to accommodate these dynamic situations (Figure 13-78).

Figure 13-75: Altair walking the streets of Acre

Figure 13-76: Altair scaling a wall

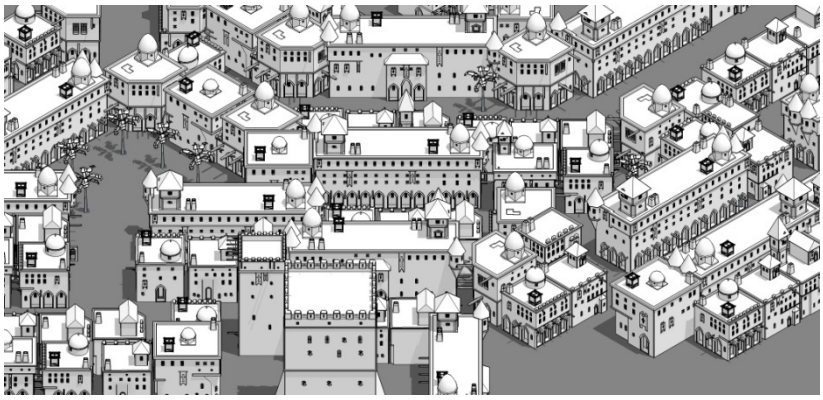


Figure 13-77: Acre's urban density, based on models by Jonathan Good

Figure 13-78: Acre's streets, based on models by Jonathan Good

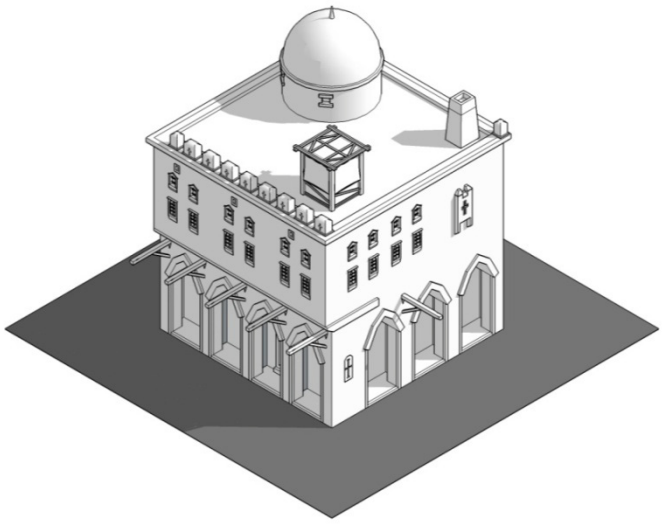


Figure 13-79: Typical Acre unit, based on models by Jonathan Good

Unlike previous case studies, details play a large role in the flow of movement throughout *Assassin's Creed*. Much of the gameplay relies on climbing vertical surfaces, and knowing what surfaces can be scaled is key to escaping enemies quickly. Climbing grips are cleverly disguised as window sills, ornaments, and other architectural details. These details provide an iconography that aids in the gameplay experience. The placement of these details also adds to the challenge of the game, as not every surface can be scaled.

> The player can go anywhere and we had to deal with it![89]

Acre and the other cities presented in Assassin's Creed are prime examples of spatial modes contributing to the flow of a game. Every aspect of these cities presents goals, feedback, challenge, and balance to the game that keep players in the *Assassin's Creed.*

[89] Hellard 2007

13.4 | PORTAL: TEST CHAMBER 10

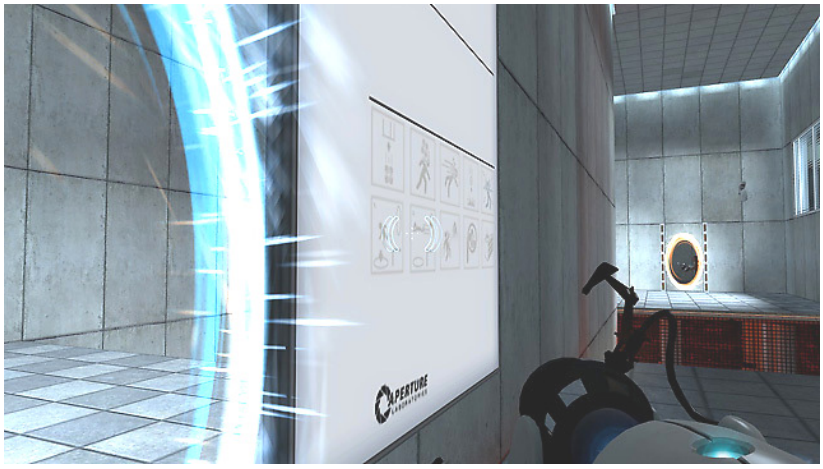


Figure 13-80: Seeing yourself through a portal

You awaken in a cold, sterile room. It's barren except for a toilet, the bed pod from which you arose, and a radio playing a chipper tune that seems completely out of place in your spartan surroundings. You have no idea who you are or why you're here, but it's clear that something isn't right— everything around you is in a state of disrepair, and the monotonous, synthesized voice that's gently prodding you out of your chamber doesn't seem to be quite all there.

It is clear, however, that you have some high-tech toys at your disposal. For better or worse, this unhinged artificial intelligence is apparently your only shot of getting out of wherever it is you are in one piece, and given how crazy things are looking, you're going to need all the help you can get.

In the world of Portal, you're a human rat trapped in a high-tech maze, and you need lightning reflexes and a whip-crack mind to navigate through it. Luckily, you also have science on your side...sometimes, anyway.[90]

[90] Hodgson, Stratton and Lopez 2007, 217

As mentioned in the “Details” section of this thesis, Portal is a single-player first-person puzzle-platform sci-fi video game that uses the concept of portals to transport the player through a variety of spatial puzzles known as “Test Chambers”. Below is a diagram that illustrates the more complex aspects of Portal’s gameplay mechanics with an accompanying description.

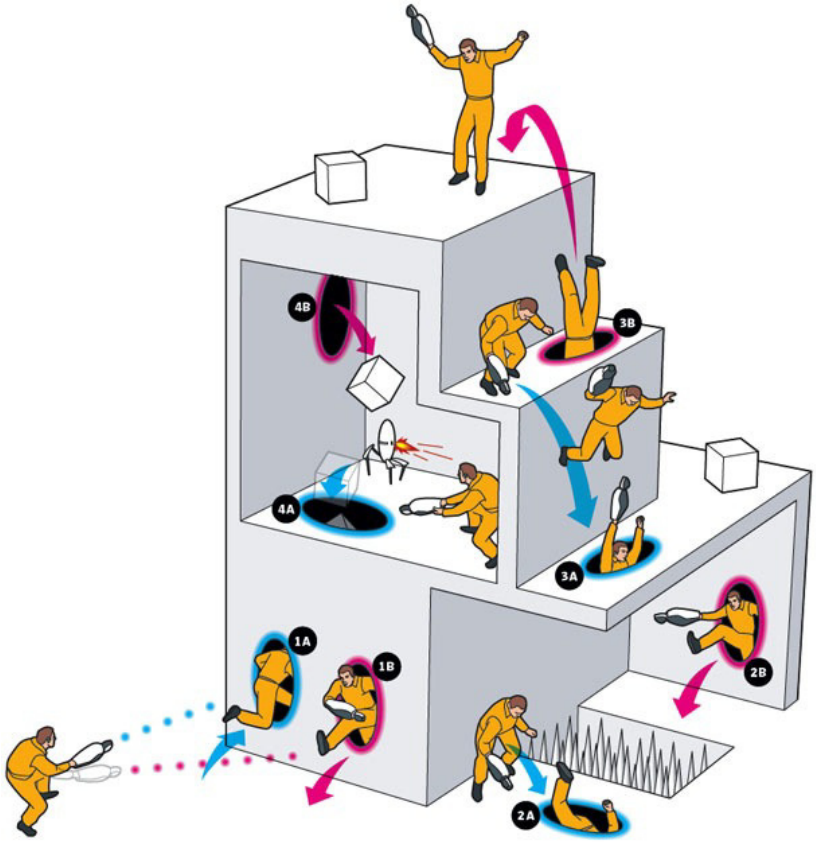


Figure 13-81: How to Bend the Laws of Physics by Jason Lee

How to Bend the Laws of Physics

1) Portal players get an Aperture Science Handheld Portal Device, which can create warp portals between any two flat surfaces.
1a) Fire at a wall, floor, or ceiling to create an entrance point.
1b) Fire where you'd like to end up to make an exit point.

2) Some obstacles can be dodged only by creating portals.
2a) Blast an entry point in the ground.
2b) Create an exit point on the far wall. Drop through the hole in the ground and you'll emerge on the other side of the spike pit.

3) The game poses conundrums, like how to get up to a platform that you can't jump high enough to reach. The solutions often rely on the fact that momentum is maintained when warping.
3a) Create an entry portal one level down.
3b) Bore an exit point on the floor next to you. Leap down into the entry portal. Even though you'll be moving in the opposite direction, when you reemerge your inertia will propel you all the way to the upper level.

4) Take advantage of objects in the environment to neutralize gun emplacements and other dangers.
4a) Open an entry portal under a box.
4b) Put an exit portal above the gun. The falling box will gather enough speed to knock over the gun.[91]

[91] Rossingnol 2007

13.4.1 | MAGIC CIRCLE

The concept of *Portal* completely transforms ones perception of space. The portal gun is able to create instantaneous corridors and thresholds that bypass the normal time and space required reach destinations. Within the magic circle this fantastic concept is accepted as reality and justifies the puzzling environments presented. Walls, floors, and ceilings are no longer barriers, but blank canvases that can be used to reach other destinations. A drop off a ledge that would be considered fatal in both real life and other games is now an opportunity to create momentum into a portal. However, the spaces are still bound by a set of rules. As mentioned in the "Details" section of this thesis, only certain surfaces can have portals created on them. Only two portals can be created at a time. Being shot by a turret can still kill you. While the portal gun seems to be a god-like tool, the rules of the game bind the player in the test chambers.

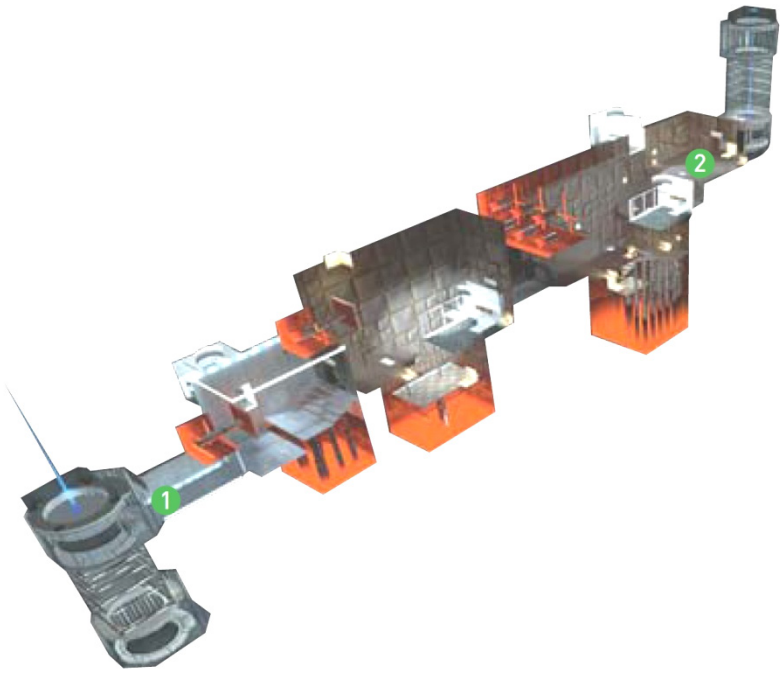


Figure 13-82: Test Chamber 10, 3D overview

For the sake of simplicity this case study will examine "Test Chamber 10", an early chamber in the game. At this stage your gun can only produce blue portals and the orange portals are set in place. The player must place their portals correctly to reach the other end of the test chamber.

13.4.2 / FLOW

Portal is a game of spatial puzzles that are designed to be solved, but also to challenge. The beginning chambers of the game are designed to teach players to use various techniques that can be used to solve more complex problems in later stages. “Test Chamber 10” is used to teach the player about the “flinging” technique. From the official strategy guide:

> “Flinging” is an advanced technique whereby you transform downward momentum into forward momentum by means of cleverly placed portals. This is mainly used to clear large gaps or obstacles when more orthodox means, such as stairs or lifts, aren’t available. The concept is simple: You place portal A on a high wall across from the area that you wish to fly over. Meanwhile, portal B is placed deep in a pit. When you jump into portal B, you’ll emerge from portal A with all the momentum you gained from falling into the pit intact. This should be more than enough to propel you across the gap or obstacle.[92]

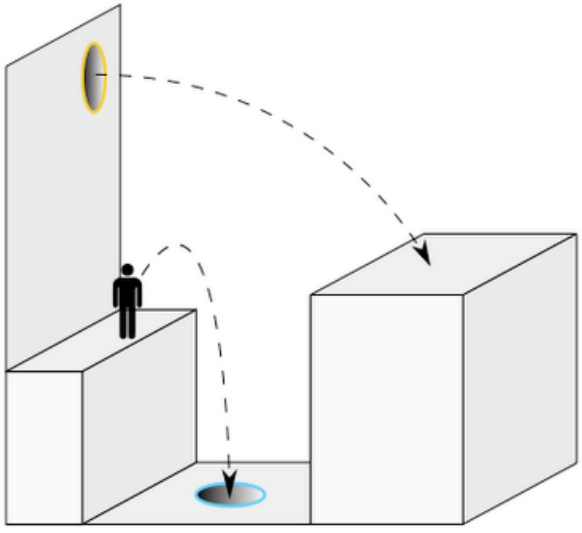


Figure 13-83: "Flinging" diagram in Portal

In “Test Chamber 10”, the player must correctly place their blue portals on the walls in order to reach previously unattainable platforms. The following section diagram and images depict the sequence the player must complete to exit the chamber.

[92] Hodgson, Stratton and Lopez 2007, 219

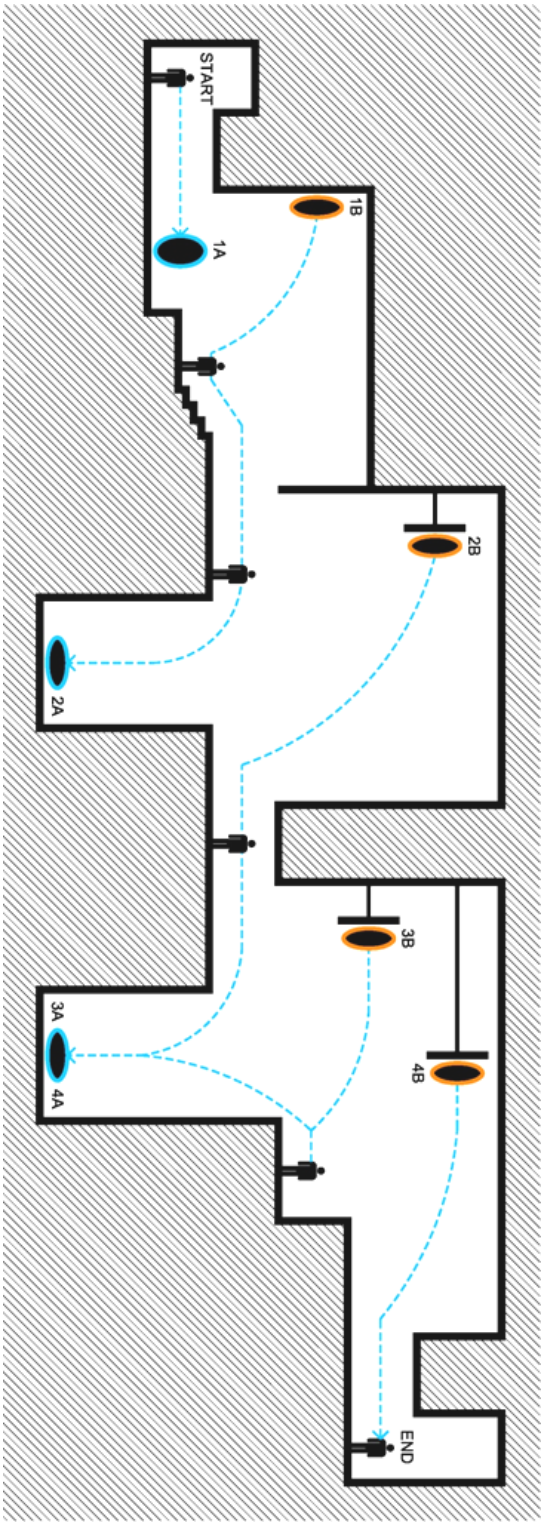
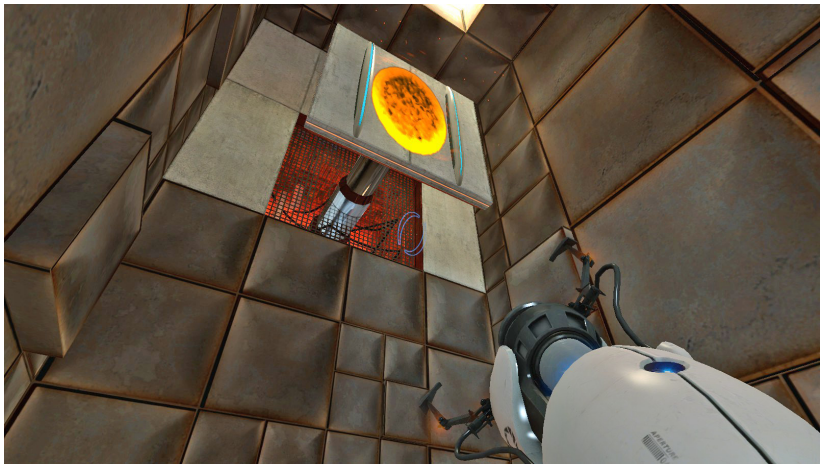
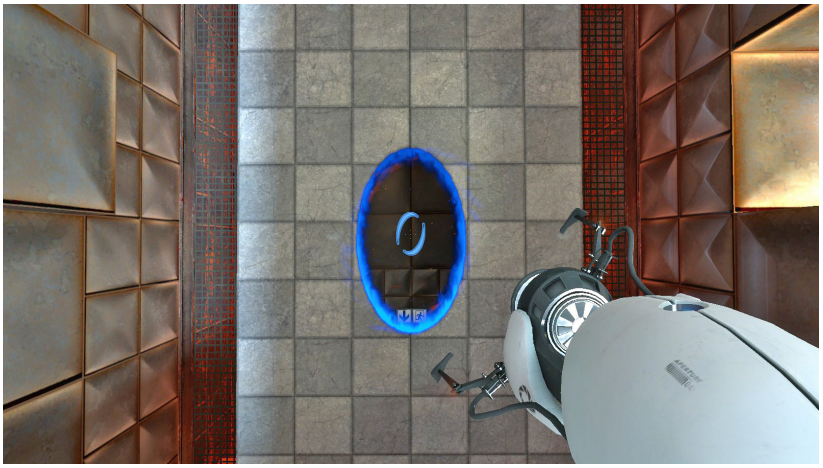


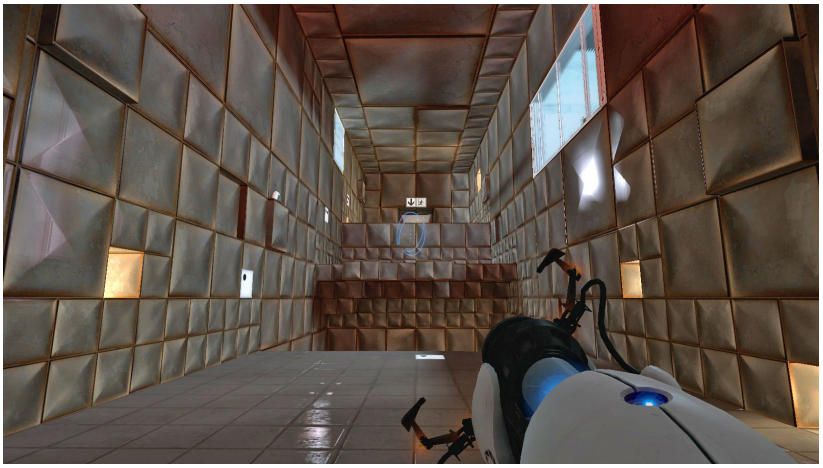
Figure 13-84: Test Chamber 10, section diagram, N.T.S.

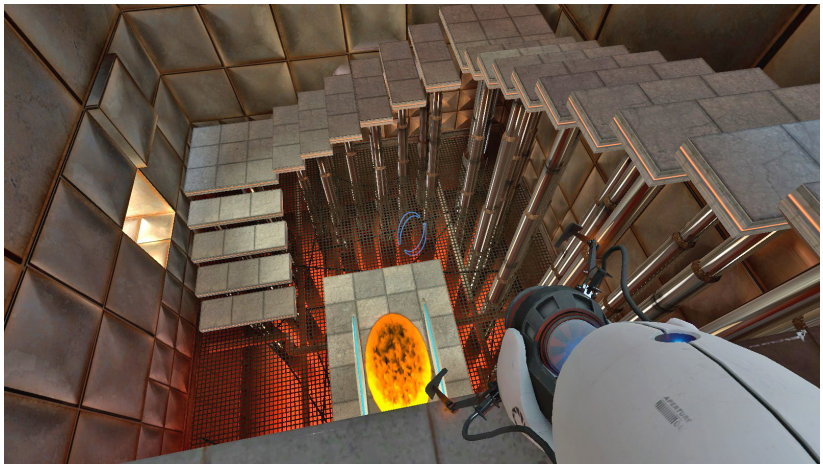

10

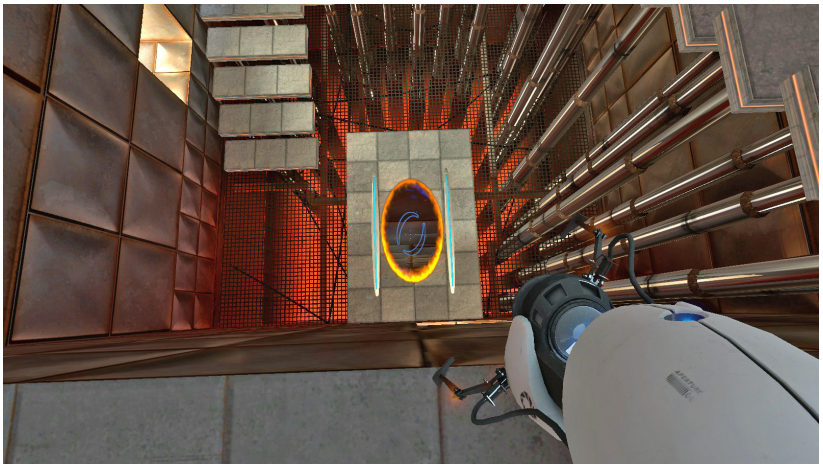

APERTURE











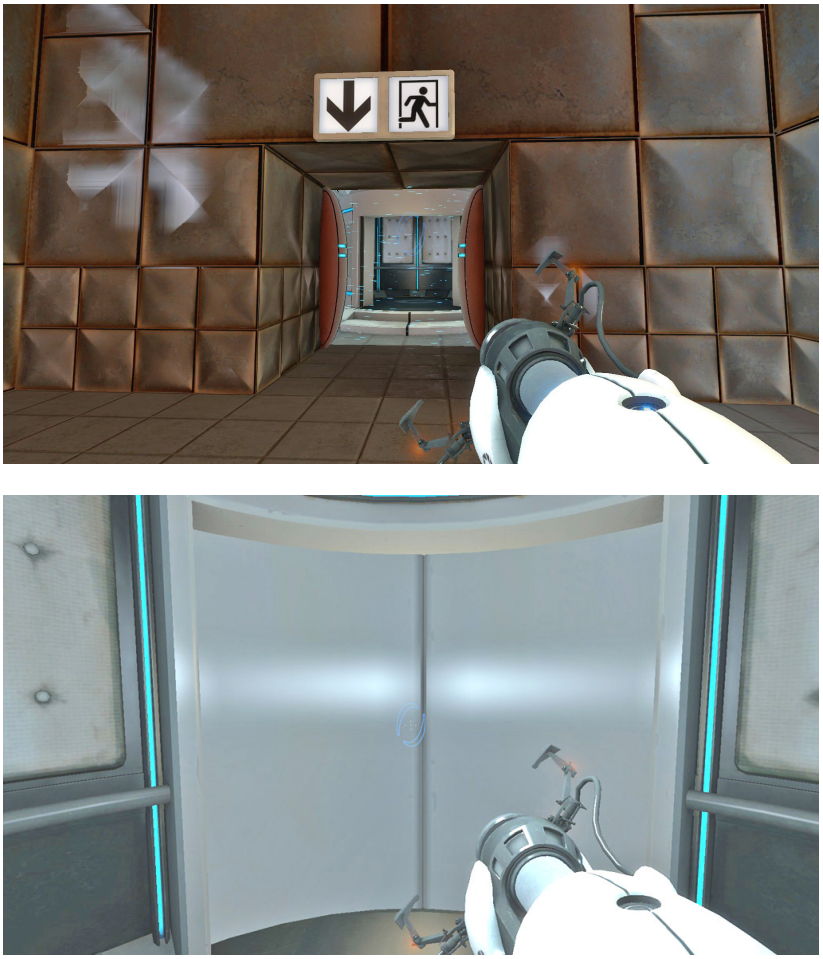


Figure 13-85: Test Chamber 10 sequence

In the behind-the-scenes book, *Portal 2: The Final Hours*, game journalist Geoff Keighley explains the environmental challenge of *Portal*:

> All video games are puzzles. They just have to be solved in different ways. In a first-person shooter like *Call of Duty*, the puzzle is how to navigate a byzantine environment while avoiding enemies. *Portal* is a puzzle game with a twist: The environment is the enemy. There are no solider in the way, but you can't just walk from the entrance to the exit. You have to use your portal creating abilities to successfully navigate each "test chamber". Physics and momentum are your bullets. [93]

Portal is truly about the use of space to create flow. Each map has a clear goal or node: the exit door. While details and iconography play a large role in the guidance of the player, much of the spaces are defined by their barriers and enclosures. Players are limited to the spaces of the chambers. The player gains immediate feedback of success when they defeat a dead end by "portalling" their way out of it, or by reaching a platform. As a whole, the entire game is also paced in order for flow to occur in terms of challenge and skill. Beginning maps are simple, and teach the basic concepts that are practiced before the player is left to solve complex test chambers (Figure 13-86). Each chamber is more complex than the last, essentially following the line of flow on a graph (Figure 13-87). By the end of the game the player's skill is equal to the complexity of the test chamber.

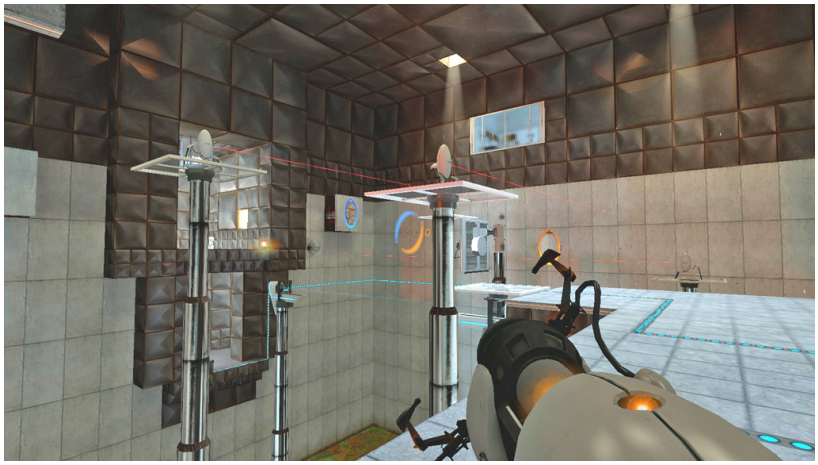


Figure 13-86: Test Chamber 18

[93] Keighley 2011, 2 of 6

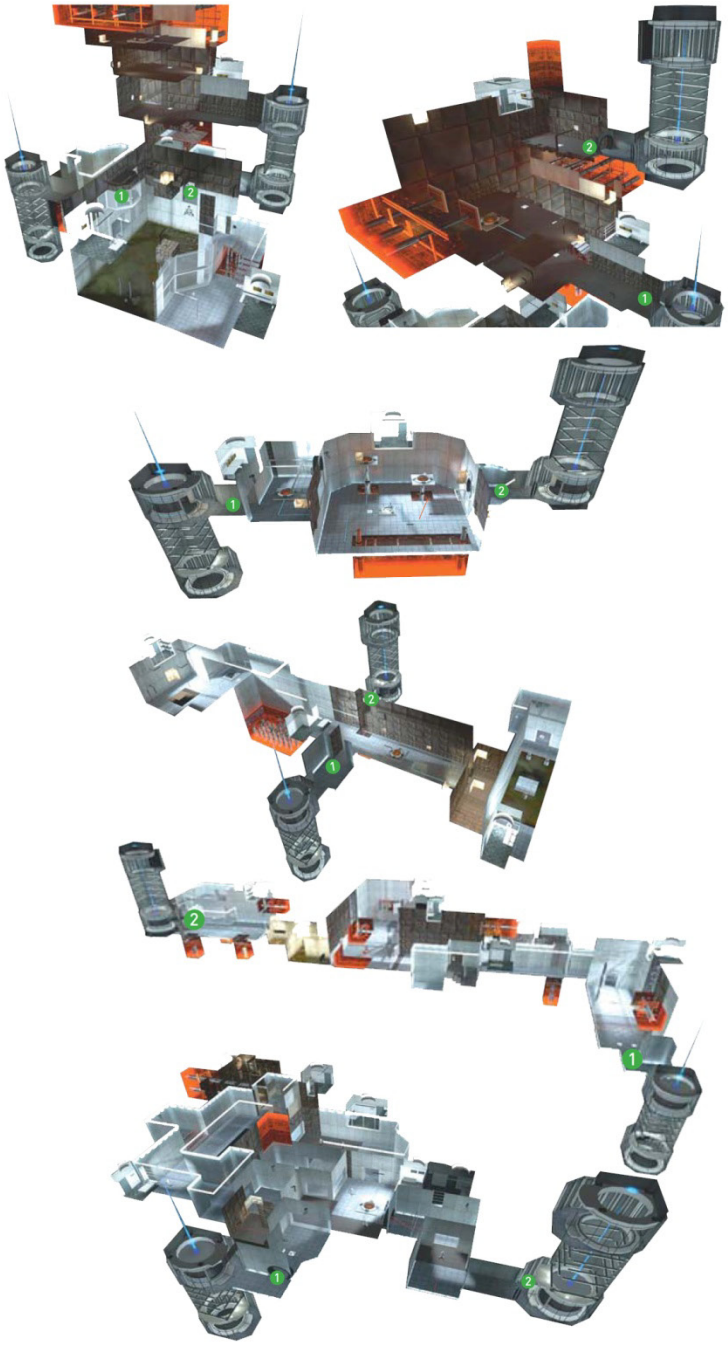


Figure 13-87: Test Chambers 11 to 16

In order to ensure flow in *Portal*, the game designers relied heavily on the use of playtesters. Playtesters are individuals brought in during the design process to test the game to identify issues unseen by the developers. Playtesters usually play alone and note any issues in a questionnaire that are then reported to the design team. The *Portal* designers utilized a unique approach in which they used a new playtester every week and actually observed them playing, to monitor their happiness, frustrations, and, generally, their immediate reactions. The designers observed where players got stuck and even how they solved problems differently than intended. After each session, the designers would improve on the tested maps and create new maps from observed behaviours. From the *Portal* designers:

> This rapid iteration on our maps helped us create a very smooth difficultly ramp. If more than one playtester had problems in a certain area we would break out problem-solving concepts into separate sections. For instance, in one of our maps there is a section where you have to reorient an energy ball through a portal twice to direct it into an energy ball socket to activate a sliding platform. Originally, this was our first introduction to puzzles that involved redirecting energy balls. Several of our playtesters would get stuck in this section for a very long time and get really frustrated. So we broke this concept out into another two sections which involved redirecting an energy ball only once. We tested this progression of three sections, and by the time the players got to the final section they managed to grasp the concept much quicker than early playtesters were able to.[94]

Perhaps the success of *Portal* is the design using this technique. In a way, the designers where creating spaces specifically for flow to occur, letting players skill increase equally with the challenge of the game. Beyond the fact that is a fun game, *Portal* is a game that demonstrates the infinite possibilities of space in video games. While in reality, most of Portal's maps are linear paths similar to those of Half-Life, the inclusion of the portal mechanic allows a simple gap in space to become a perplexing spatial puzzle.

[94] Swift, Wolpaw and Barnett 2008, 10

14 | DESIGN SYNTHESIS

The design synthesis aims to create a video game space developed using the principles gathered from the analysis and case studies presented by this thesis. Firstly the design will demonstrate the transformation of a preconceived space by the rules and concepts created by the magic circle. Secondly, the space will utilize the dimensions of flow in space developed earlier in this thesis to form an effective space for flow to occur.

14.1 | THE UDK

> UDK is Unreal Engine 3 – a complete professional development framework. All the tools you need to create great games, advanced visualizations and detailed 3D simulations on the PC and iOS. The best tools in the industry are in your hands. [95]

The *Unreal Development Kit (UDK)* is program that allows anyone to create video games and other visualizations using Epic Game's *Unreal Engine 3*. The *UDK* is similar to many 3D modeling programs like 3D Max and Rhino, with the additional ability to program interactivity into the environments created.

The *UDK* was chosen for this thesis mostly due to its ability to create standalone games and products. Other propriety game editing software requires for users to purchase and install the base game first. For example, Valve's *Hammer Editor* would require the installation of *Half-Life 2* or another *Source Engine* game in order to play a creation. In this case, the product would be a modification of an existing game, or a mod, as the industry calls it, rather than a single standalone game. This is not to say that the *Hammer Editor* and other similar programs are ineffective, it is merely that this particular situation is better suited for the *UDK*. With the intention to reach architects the game, the *UDK* allows for a more ubiquitous platform for exploration.

[95] http://www.udk.com/

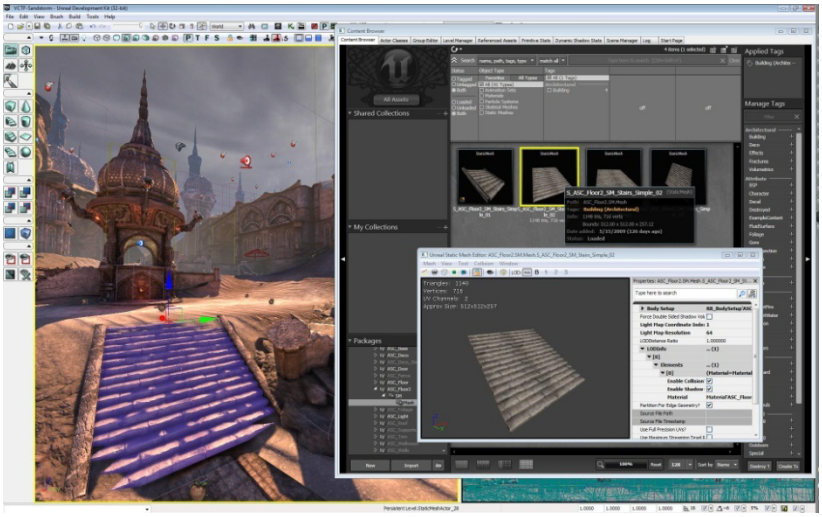


Figure 14-1: Editing in the UDK

14.2 | DESIGN STRATEGY

The design will utilize an existing gameplay mechanic present in the *UDK*, multi-player capture the flag (CTF). Since this thesis is not about the design of effective gameplay mechanics or narrative, a prepackaged gameplay device is sufficient to demonstrate the effect of designed spaces on games. CTF is a multi-player gameplay mode that is easily repeatable, offering a different experience each time.

To demonstrate the transformation and manipulation of the space by the magic circle, the design will use an existing real-world world space as the basis for the virtual space. Due to its familiarity by students and faculty, the University of Waterloo School of Architecture (UWSA) will be used to model a video game space. The gameplay of CTF will transform the school, a space of education, production, movement, and gathering, into a space of frantic competition. The game will take liberties with the accuracy of the space in virtual form, adding and subtracting volumes to accommodate effective flow in the space.

Due to the CTF and multi-player aspect of the synthesis, the design draws from many of the lessons observed from *Call of Duty: Black Ops'* "Nuketown". An overall minimization of space will ensure equal opportunities for action. Obstructed sight lines and paths will play a large role in balancing the effectiveness of the existing space. While the UWSA is different from Nuketown due to multiple floors, the principles of maintaining a balanced, challenging space remains. The following sections will introduce the existing building and the intentions behind proposed virtual modifications.

Figure 14-2: UWSA atrium stair, by Ben Rahn at A-Frame

14.3 | DESIGN PROCESS

14.3.1 | SITE

Figure 14-3: The UWSA, by Ben Rahn at A-Frame

> The School is located in a splendid historic building - the former Riverside Silk Mill - located in the heart of the old Galt neighbourhood of Cambridge. Situated along the banks of the Grand River, the former industrial building provides wonderful spaces for design studios, labs, and classrooms. It also includes a superb design library, exhibition galleries, public auditorium, and cafe.[96]

The UWSA is a three storey building with a central circulation atrium that supports various program elements. On the ground floor are two lecture halls, a workshop, the Melville Café, and the Design at Riverside art gallery. On the second floor are the main office, the library, the photo lab, the computing and media labs, and a bulk of the offices and classrooms. On the third floor are the design studios, loft, and remaining offices.

[96] UWSA Cambridge 2011

The existing building already presents itself as a fairly effective map for FPS gameplay. Circulation is designed with care to avoid back tracking and to ensure that all program elements are accessible. Using the *Black Ops* design rule, each section of the school has a clear means of exit as well as multiple paths from one room due to both safety and circulation. This allows visitors to understand the space fairly quickly, allowing them to move freely with little confusion.

The school also allows for many chance encounters or collisions to occur, due to the array of intersecting spaces that flow into one another. Many spaces are also designed to offer privacy (such as the studios) using a variety of separations and baffles. The heavy masonry structure of the atrium also provides many opportunities for concealment, creating almost a forest of columns (Figure 14-4).

Figure 14-4: UWSA atrium columns

Overall, the school offers a space that is ideal for a CTF match as it is an easy space to move through and features multiple means of reaching a single destination. The non-linear fashion of these paths also ensures that players would have an opportunity to both evade capture as a runner and ambush runners as a defender. However, to create a truly effective game space, some manipulation and precision will be required, and will be explained in the following sections.

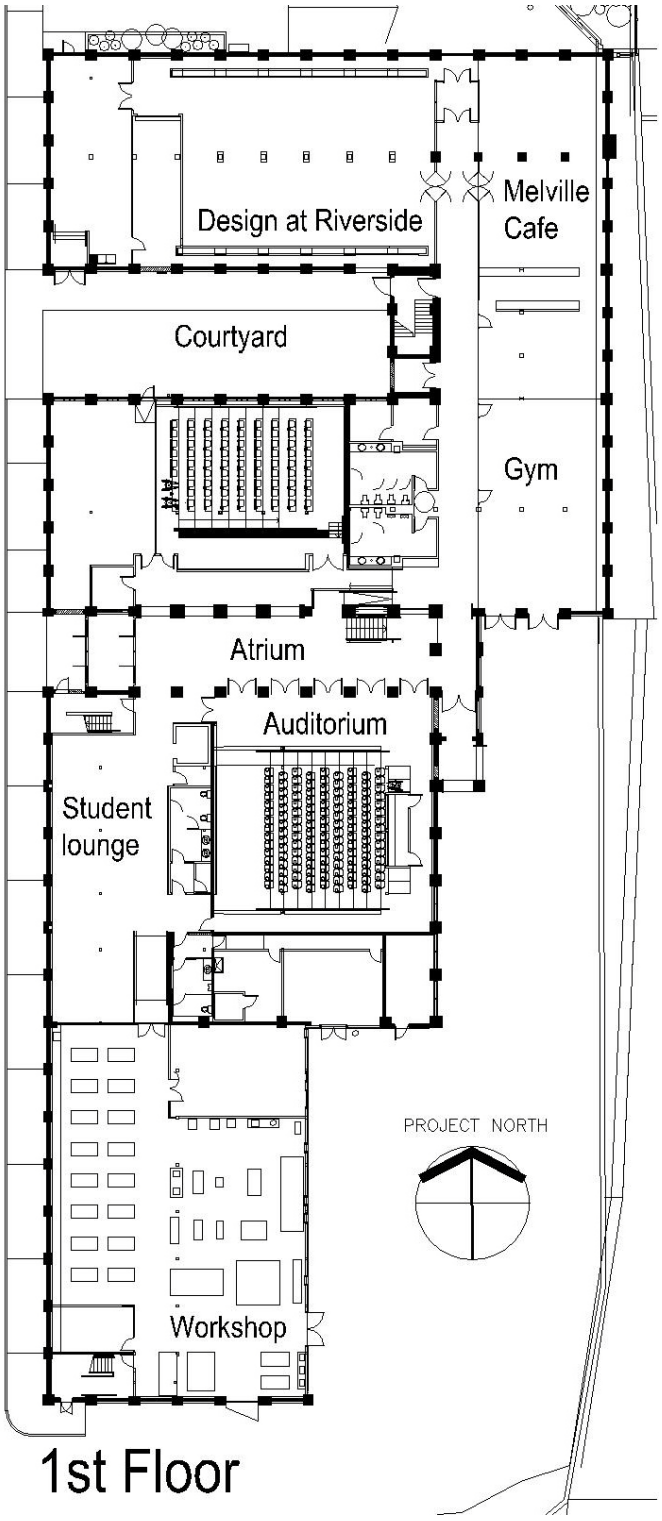


Figure 14-5: UWSA 1st Floor

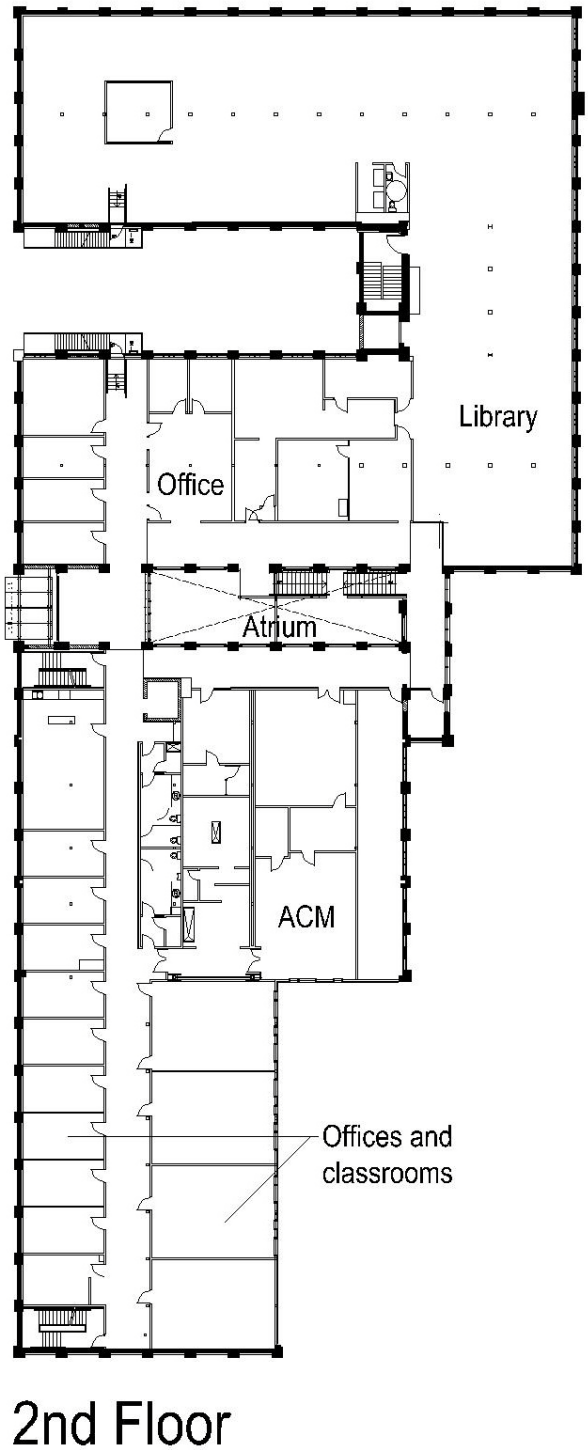


Figure 14-6: UWSA 2nd Floor

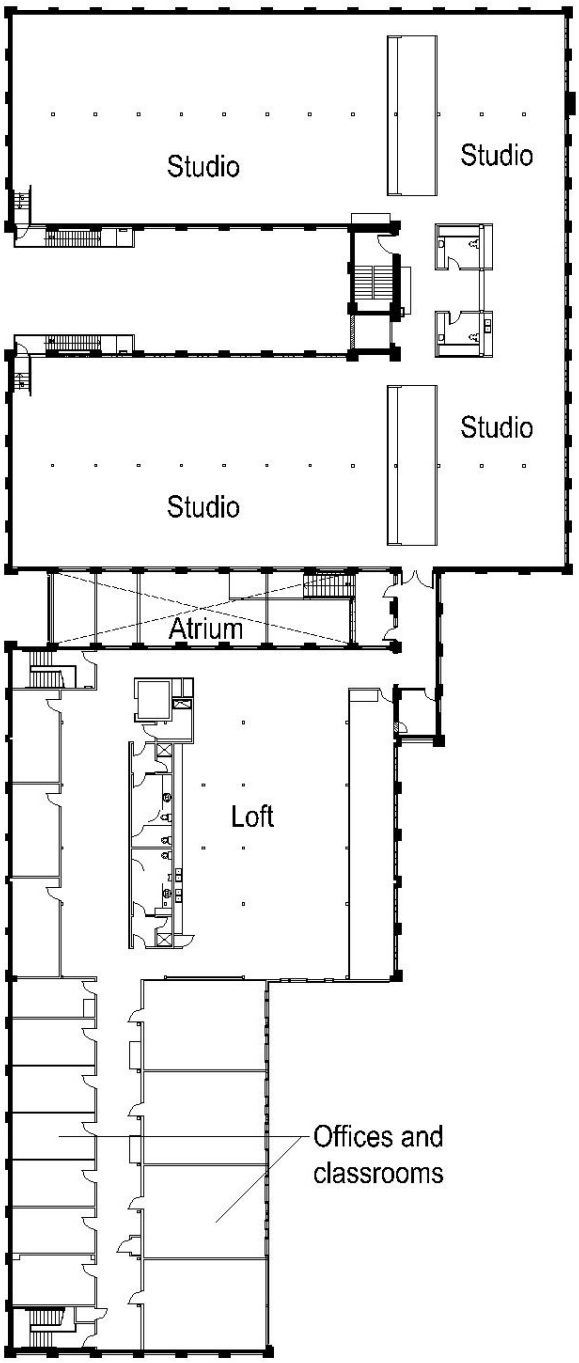


Figure 14-7: UWSA 3rd Floor

14.3.2 | ENCLOSURE

While the entire school could be used as a single game world, for the purposes of a CTF game, it would be too large, especially given that the building is three floors. In CTF, a long stretch of travel means more opportunities to be attacked and ambushed. Furthermore, the using the entire school would offer too many paths, allowing some runners to run from base to base without being noticed. To address these issues, the design isolates a portion of the school to concentrate the action, as well as providing a more symmetrical, bipolar layout to support the opposing dynamics of CTF. The bipolar layout allows for teams to have both a starting point and goal for movement. The limitations of the enclosure can be conceptually justified by locked doors and rubble blocking corridors.

Figure 14-8: UWSA exterior, by Ben Rahn at A-Frame

14.3.3 / NODES

The selected space already has a variety of spatially distinct nodes that provide points of reference and destination. On the ground floor, the student lounge acts as the blue base. Adjacent to the lounge is the auditorium and atrium. The second floor is solely atrium space. On the third floor, the red team starts at the studio washrooms, leading into the first year studios, and then into the atrium. For both teams, the atrium becomes a central point of reference. Once the atrium is reached, the destination becomes clear in conjunction with the enclosure.

Figure 14-9: UWSA Main Auditorium to Atrium, by Ben Rahn at A-Frame

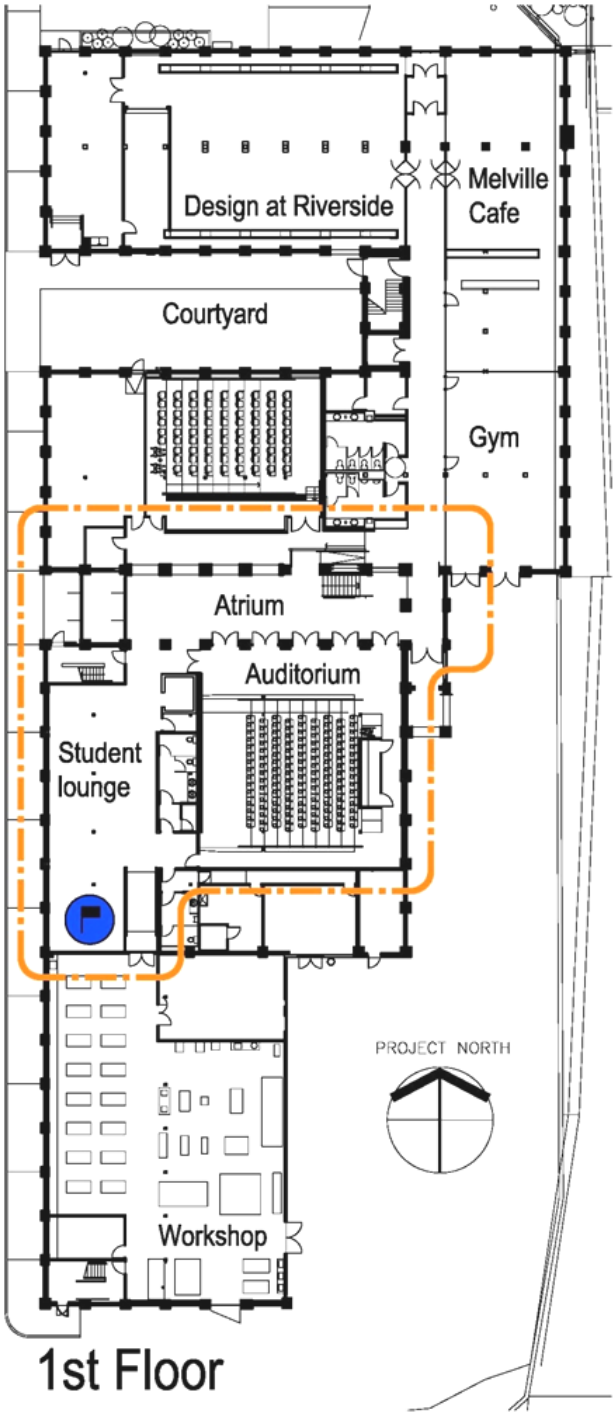


Figure 14-10: UWSA 1st floor isolation

Figure 14-11: UWSA Main Auditorium, by Ben Rahn at A-Frame

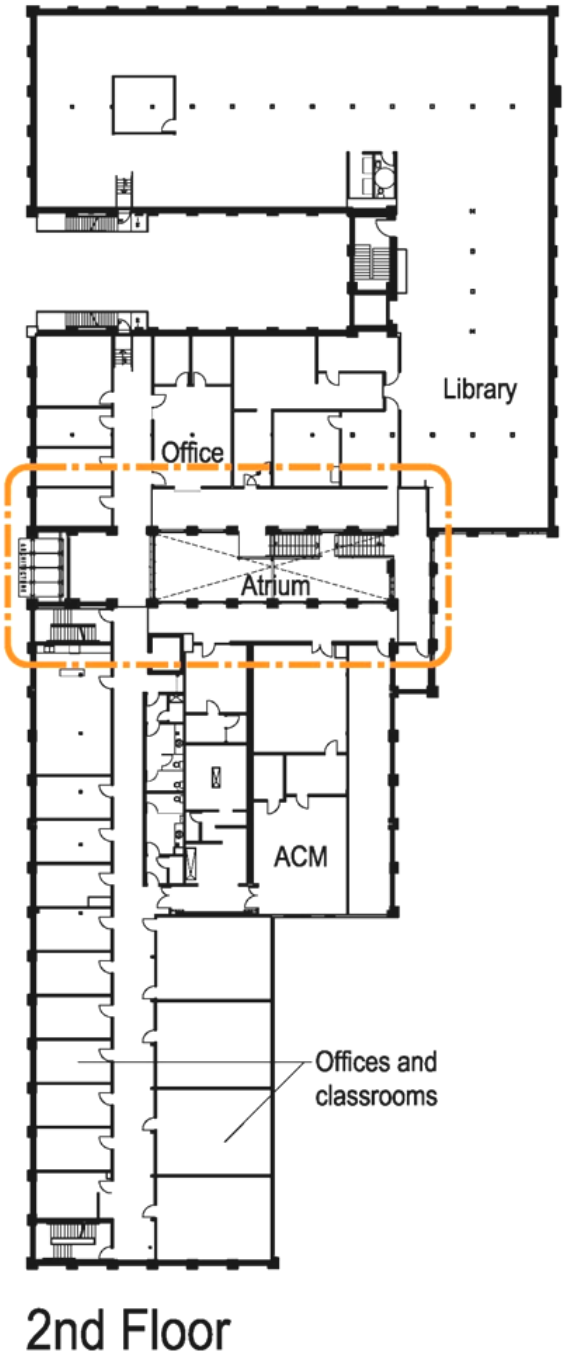


Figure 14-12: UWSA 2nd floor isolation

Figure 14-13: UWSA Atrium, by Ben Rahn at A-Frame

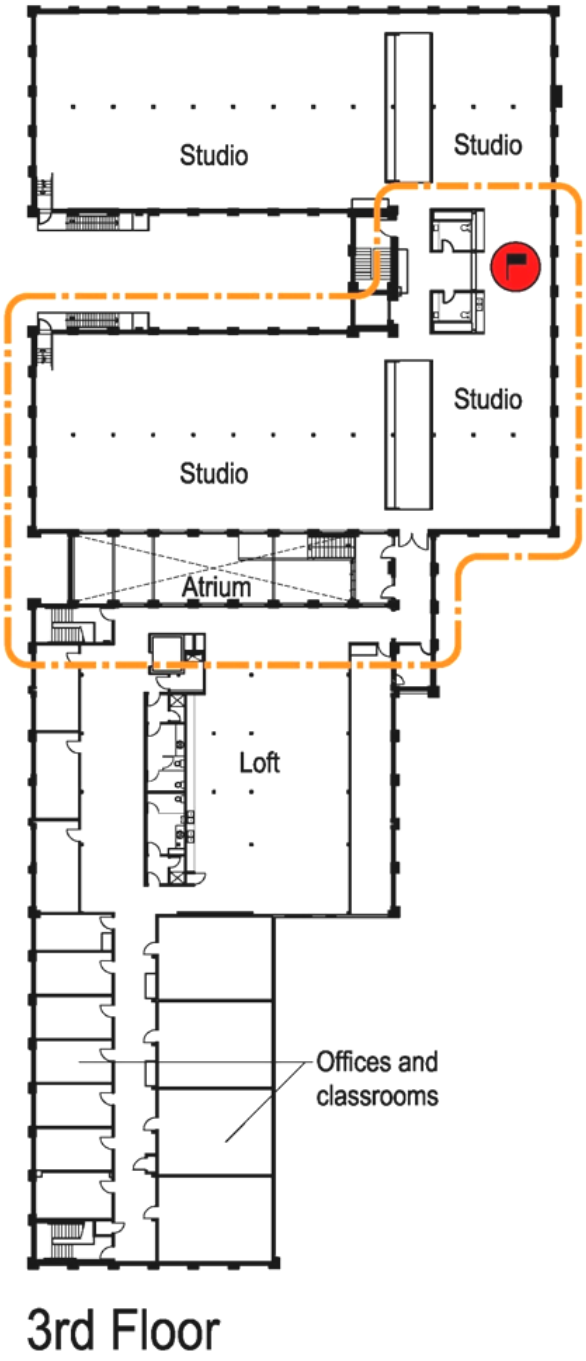


Figure 14-14: 3rd floor isolation

Figure 14-15: UWSA First Year Studio, by Ben Rahn at A-Frame

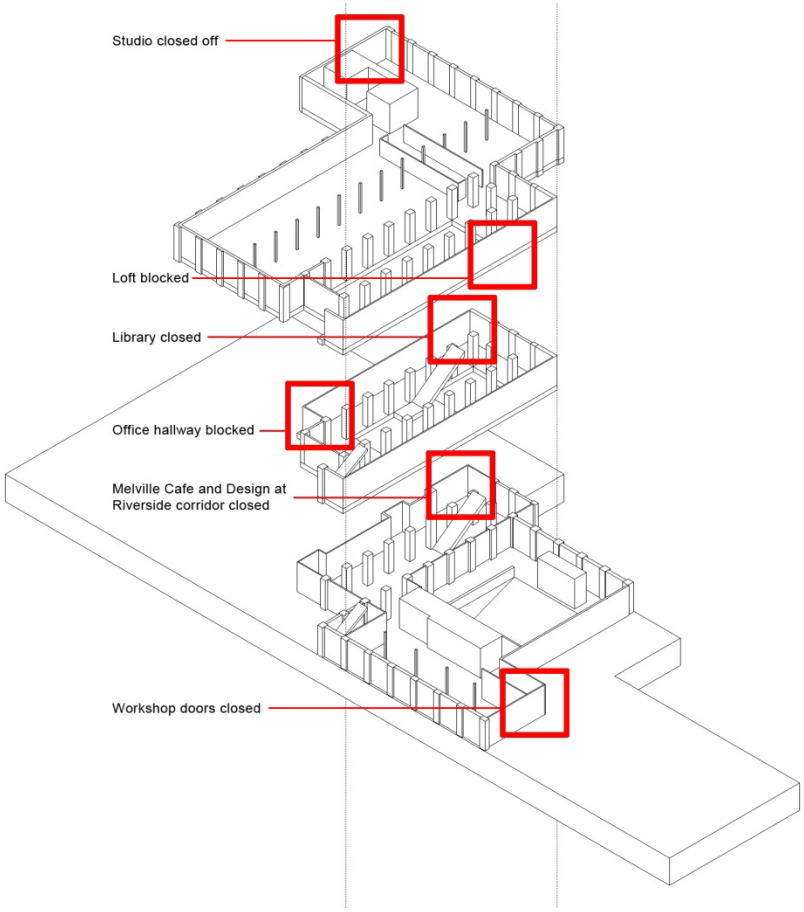


Figure 14-16: UWSA enclosure manipulation

14.3.4 | DEAD ENDS AND PATHS

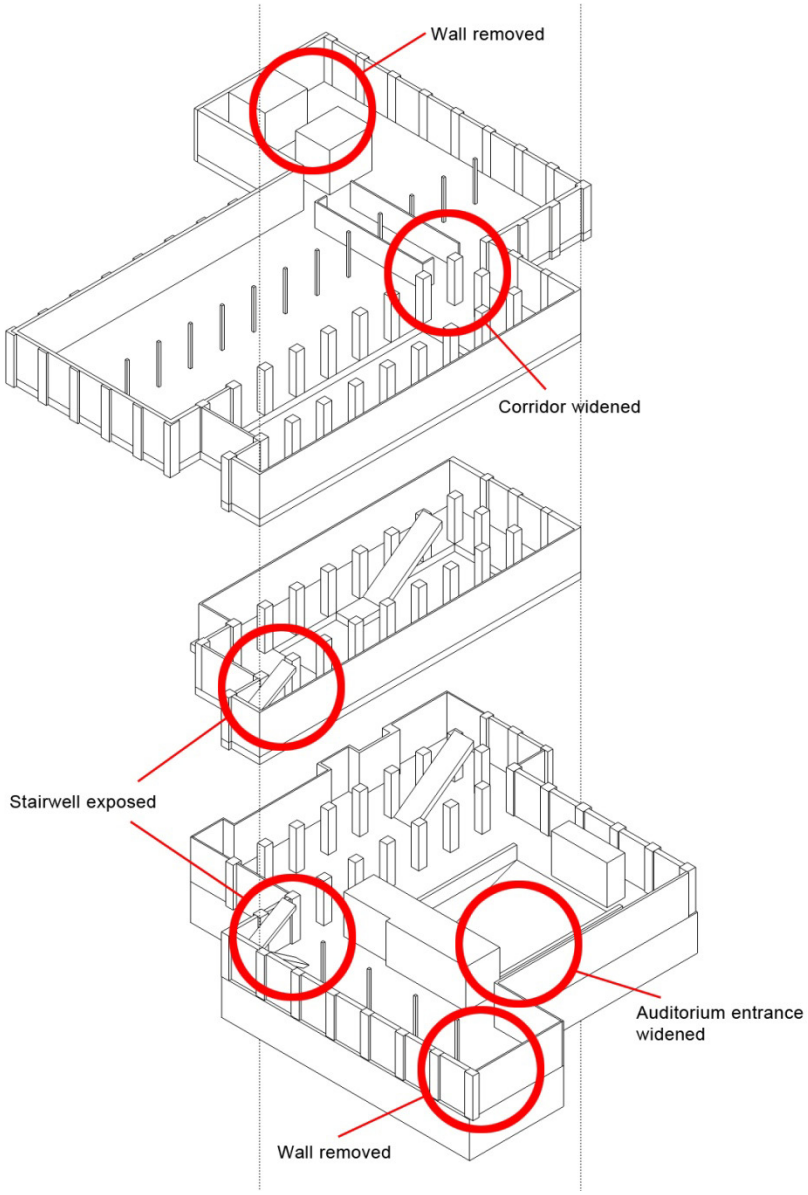


Figure 14-17: UWSA modifications for circulation

Since there are already a series of dead-ends already present in the space, most the manipulation for circulation involves the opening of paths to ensure that runners have ample opportunity to both reach and capture the flag. The goal of this manipulation is to allow for at least three means of entry to capture each flag. This is achieved by the removal of various partitions, as well as the widening of circulation paths. Multiple paths allow for runners to have a chance to escape once the flag is taken.

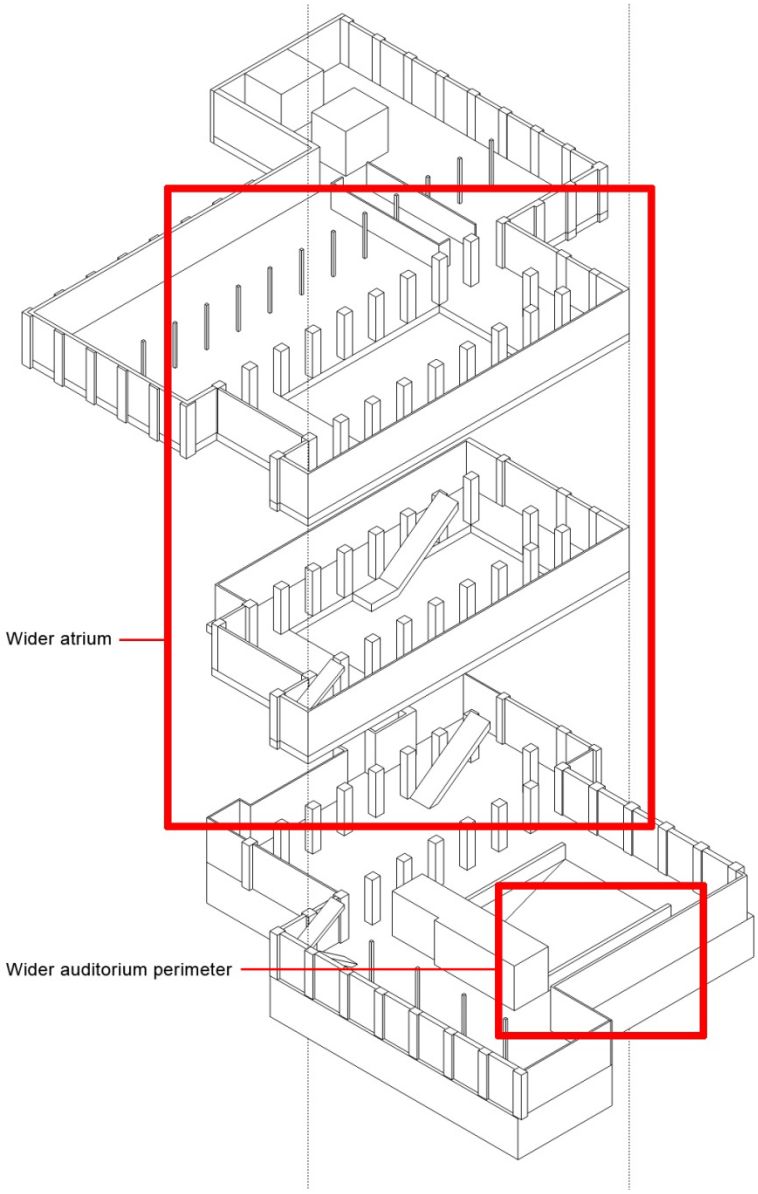


Figure 14-18: UWSA major changes

The atrium will be widened to ensure that players do not leap across it as a short cut. Furthermore, the open space of the atrium will allow for a greater challenge for flag runners, as they are left in the open. This open space will also serve as an arena space, allowing for more acrobatic and daring movements to reach, or escape, a flag. Other areas, such as the exits of the auditorium, will be removed to allow for a greater flow of movement. A path across the atrium on the third floor is also introduced to increase circulation to the secondary stairwell.

14.3.5 | CHALLENGE AND BALANCE

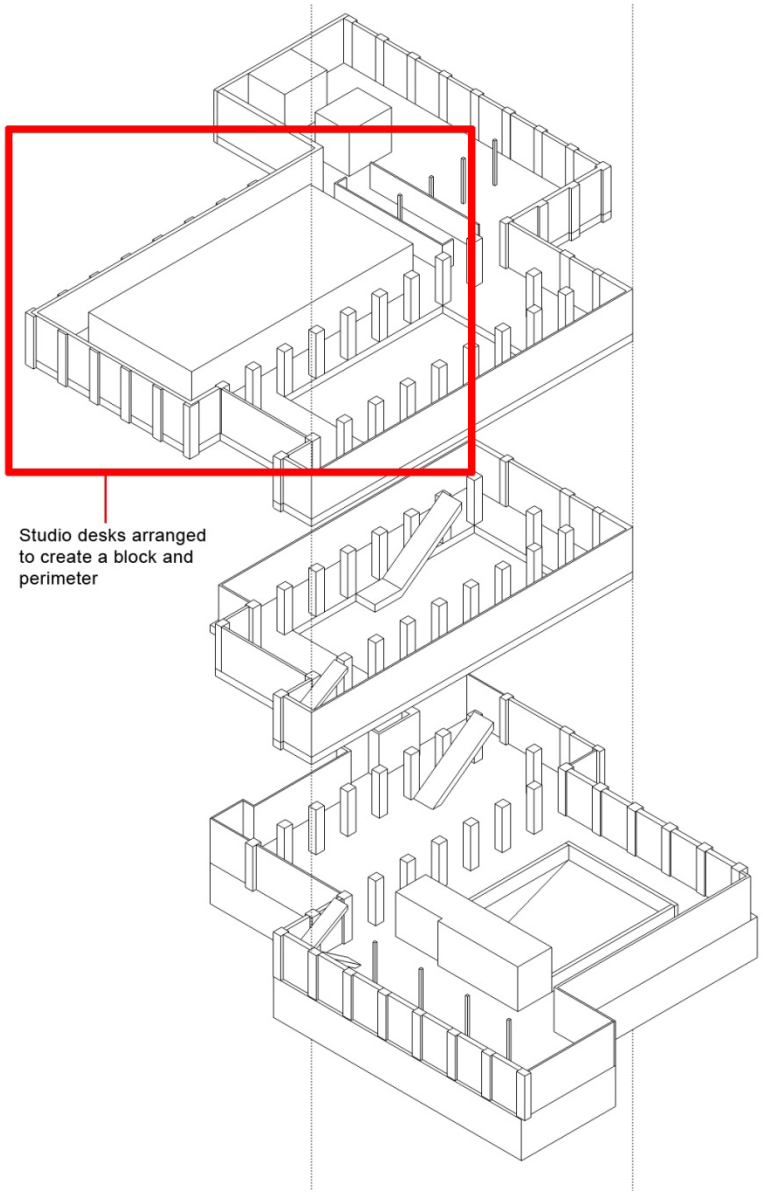


Figure 14-19: UWSA further barriers

While the existing structural layout already provides a challenging space, a variety of details are added to ensure that no team has a clear advantage with a shorter or less challenging path. Furthermore, the existing structures and baffles within the spaces allow for chance encounters to occur.

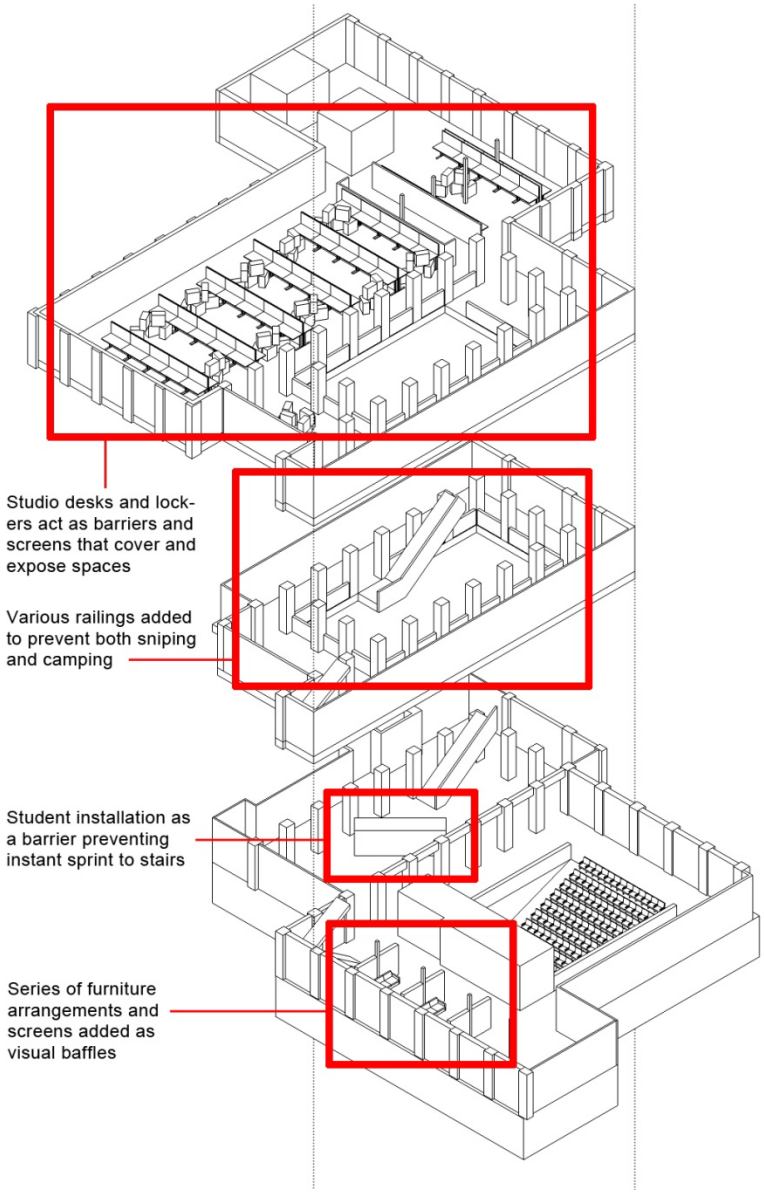


Figure 14-20: UWSA visual baffles

The goals of these manipulations of space are to allow for players to have equal opportunities for winning while still providing challenge. Building areas are isolated to ensure that players do not wander and that player density is high. Paths are cut throughout the map to allow for continuous circulation. Barriers and visual screens are positioned across the map to prevent too much sniping, as well as providing surprise encounters when turning a corner.

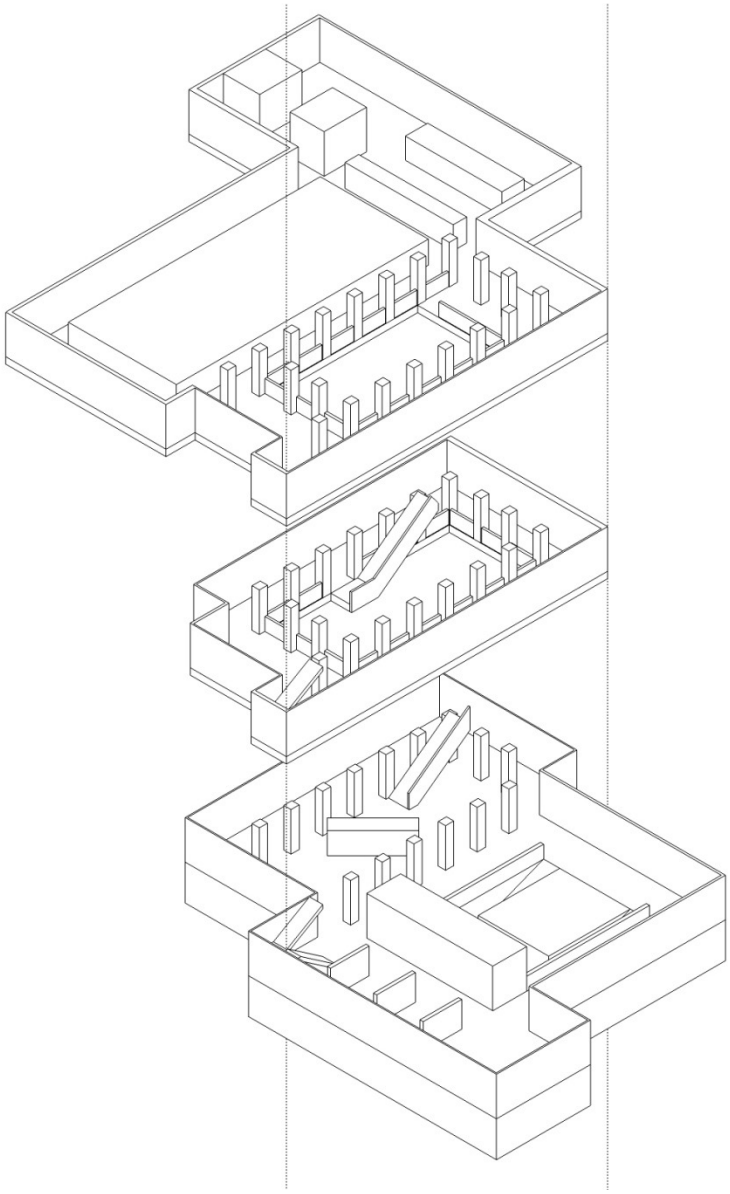


Figure 14-21: UWSA simplified map

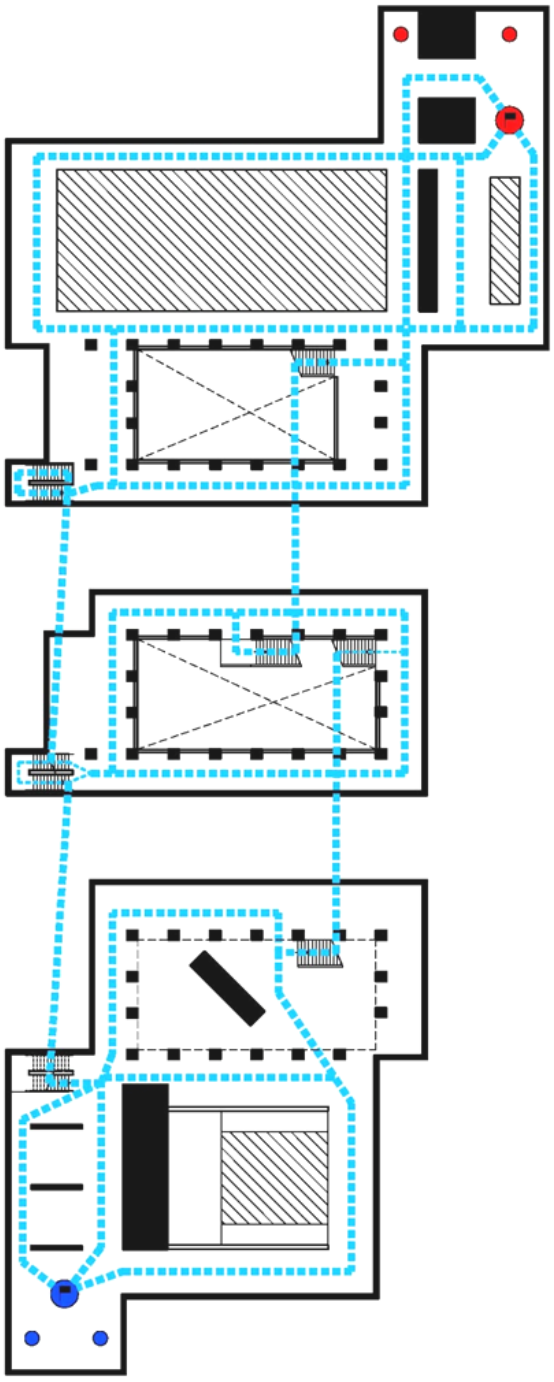


Figure 14-22: UWSA proposed map paths

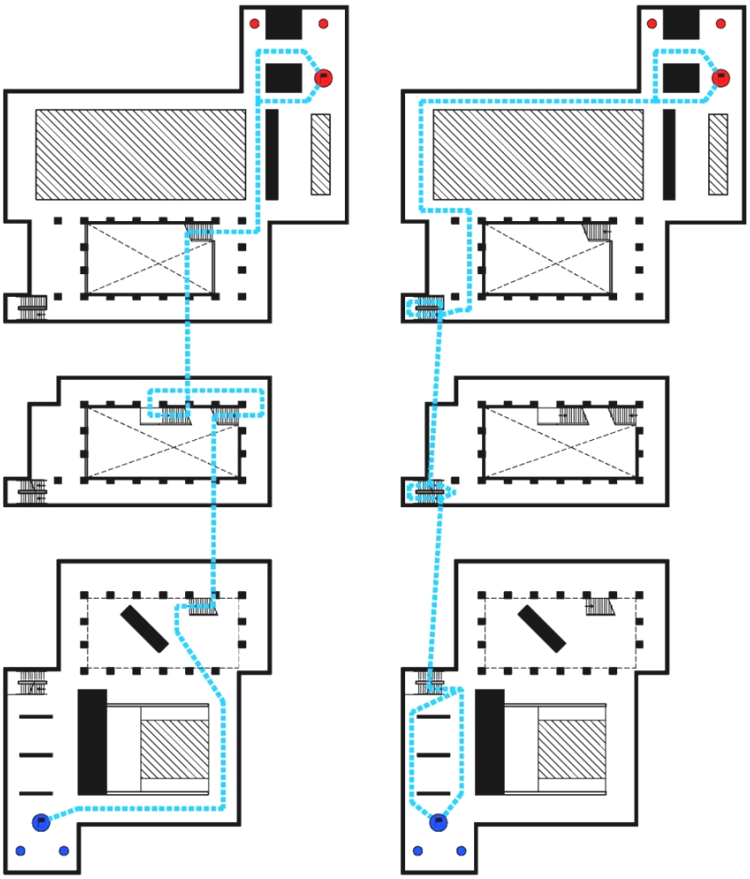


Figure 14-23: UWSA proposed map, stairwell and atrium stair paths

14.3.6 | EXECUTION

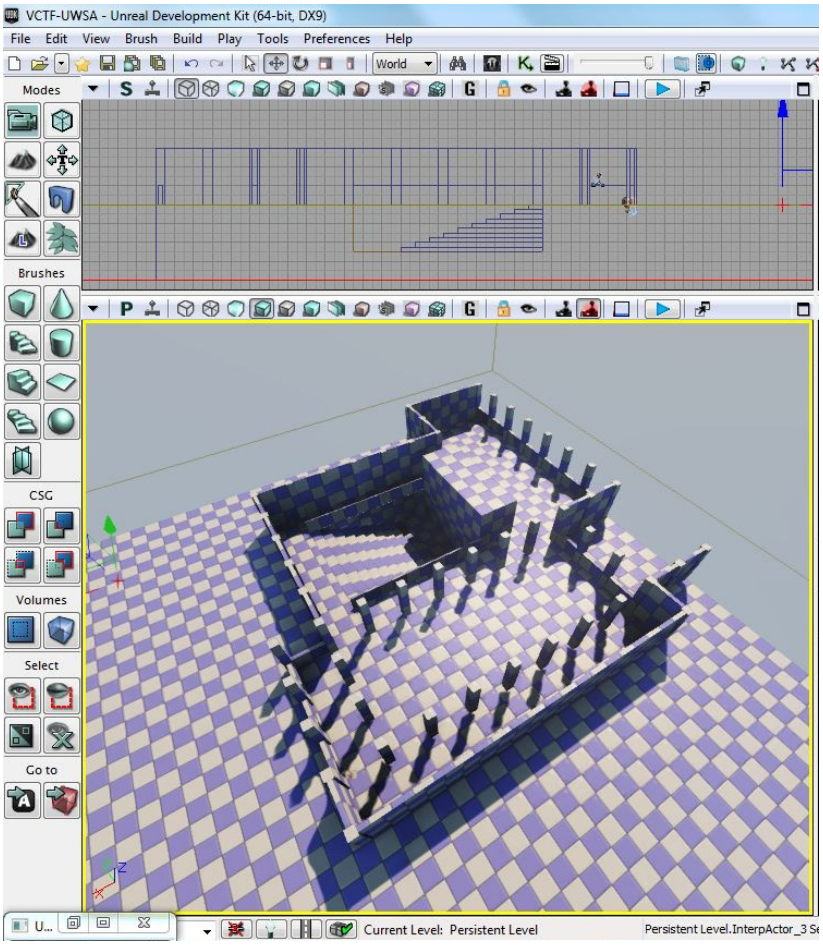


Figure 14-24: UWSA 1st Floor in the UDK Editor

The basic massing of the map was modeled in the *UDK Editor*, based off the model created for the previous diagrams. Once the structure was complete, details, objects, and textures were added to the level, mostly from prefab elements built into the *UDK* content browser. These elements are from the *UDK* source game *Unreal Tournament 3*, and have an overall style of a grimy future. Instead of trying to recreate the UWSA completely, the final map uses textures and objects (called static meshes) that approximate the spatial organization of the school. Other objects, such as health, weapons, ammo, and power-ups are placed evenly throughout the map. To allow for artificial intelligence players to play in the space, programmed pathnodes were scattered across the map to let "bots" understand where they could move (Figure 14-29).

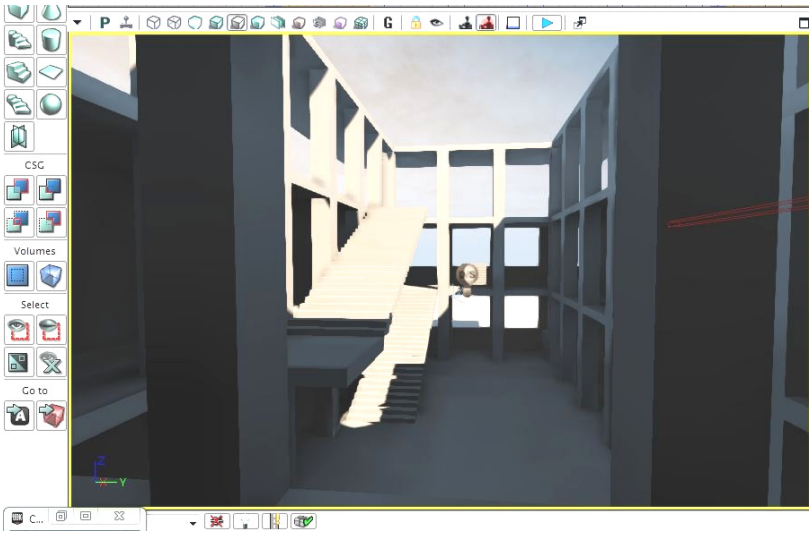


Figure 14-25: UWSA atrium in the UDK Editor

While creating the map, it could be tested in the UDK spatially to check for glitches. There were further modifications to the space through this testing, such as the reduction of window openings to avoid jumping out of the enclosure, full inclusion of the studio desk layout for more path options, and other stylistic changes like the opening of the roof to allow for more dramatic lighting.

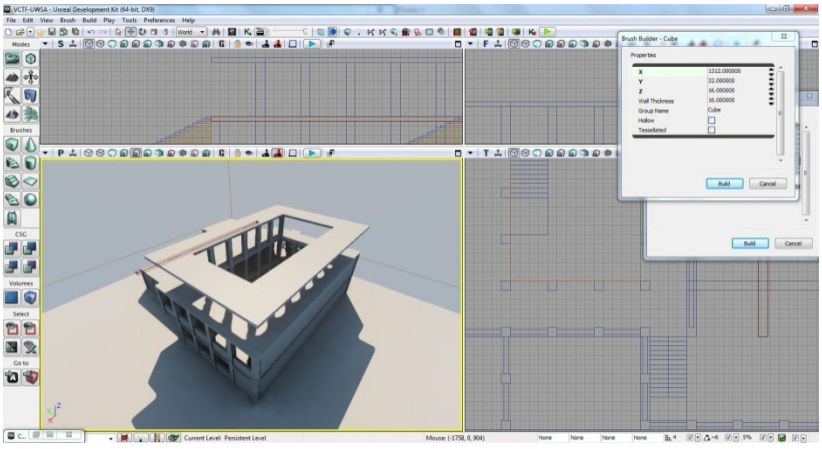


Figure 14-26: Atrium massing in the UDK

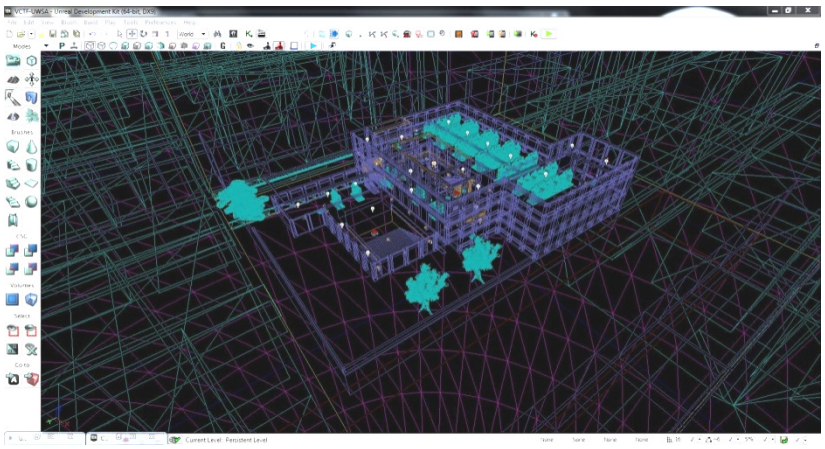


Figure 14-27: Completed map in wireframe

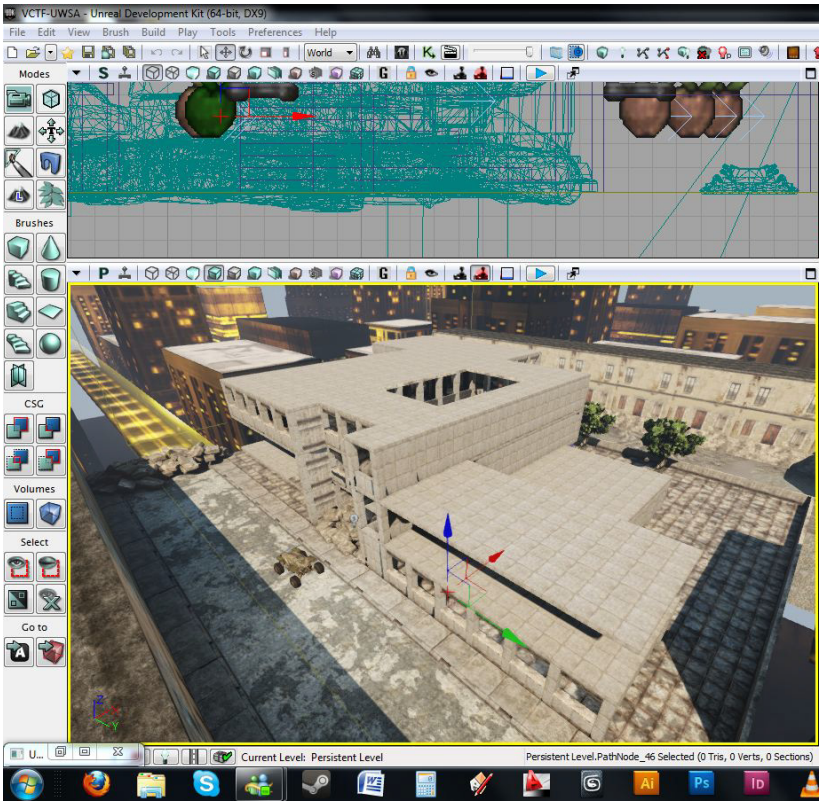


Figure 14-28: The completed map in the UDK, aerial perspective

Figure 14-29: Placing lighting and AI pathnodes in the UDK

14.4 | THE GAME

Figure 14-30: Aerial view of the VCTF-UWSA atrium in play

The resultant product is a playable multi-player map for *Unreal Tournament 3* that can be played by multiple human players at different computers. The map has also been programmed to accept AI players or "bots". Bots were able to navigate the map and play full matches with various outcomes.

The game was played by a variety of players, both familiar and unfamiliar with the school's layout, against the bots in order to test the effectiveness of the space. Their observations are integrated with the designer's critique of the space in the following sections. For the purposes of differentiating the real UWSA and the game map in this section, the game map will be referred to as VCTF-UWSA, as it is named in the game files.

14.4.1 | THE MAGIC CIRCLE

The use of the UWSA as a basis for the map alone demonstrates the transformative properties of the magic circle. The fact that the space is playable in a video game infers that a space unintended for play can be transformed into one, given the application of game rules. Players unfamiliar with the school stated that the space was fairly effective as a game space, while students were surprised how well the space worked for Capture the Flag. Beyond the obvious spatial and stylistic modifications to the UWSA in the map, the overall spatial configurations of the school still remain the same, while serving varying purposes.

Both the student lounge (Figure 14-32) and studio lounge (Figure 14-40) act as the flag bases for the teams. In the UWSA, these are places of rest and pause during hectic studio life. In the VCTF-UWSA, they serve as both spaces of entry (or "spawn points") and spaces of intense defense (Figure 14-31). The secondary atrium stairwell serves similar purposes in both situations, acting as a quick means to reach the upper floors (Figure 14-33). The auditorium is usually used as a place of presentation and education, while in the game it serves as a weapon station and alternate path to and from the blue flag (Figure 14-34).

For a student, the UWSA atrium's open levels allows for constant observation of the comings and goings of the school. It acts as a spill off area for both of the lecture halls, and space for special events (Figure 14-35). Students are able to call out to classmates from multiple levels, and perhaps bump into a classmate while walking about the floors (Figure 14-36). In the VCTF-UWSA, the atrium acts in the same manner for different purposes. The open nature allows for both teams to observe the other team in both a defensive and offensive capacity, ensuring that the flag runner is not too easily hidden. It is the central hub that all players need to enter in order to reach the enemy flag, and as such, is constantly hosting conflicts. As predicted, the column structure of the atrium creates fluctuating sightlines that can both expose and hide players as they move. The sharp spiraling circulation also promotes chance encounters for surprise skirmishes around corners. Two large masses were added to the central space to provide cover in a relatively large field of play on the ground floor where a runner could be too easily apprehended. Almost all test players stated that the atrium served as a central hub of action that hosted the most skirmishes.

In the UWSA, the studio is place of both privacy and social interaction, given the nature of the student. The aisle configuration offers ample circulation, while the desks provide visual privacy between rows (Figure 14-37). For the most part, the studio is a place of stationary working with bouts of social interaction. In the VCTF-UWSA, the studio is a maze that allows runners to take unpredictable paths to confuse and evade attacks. While in the game the desks are replaced by industrial vats, they are still similar to the desks in placement, scale, and general massing. The vats act as visual baffles that both conceal and reveal players depending on their position (Figure 14-38). These fluctuating sight lines allow for players to both hunt and be hunted during a match.

Some players also noted the paths available in the overall organization of the map. In the UWSA, there are multiple paths to a variety of locations, and different paths are taken based on the objectives of the students, visitors, or faculty members. Visitors or relaxed students may take a longer more exploratory route, while faculty or a busy student will take faster route to a destination. In the VCTF-UWSA, these paths take on a more tactical meaning. Flag runners have a choice of taking the quicker, more exposed route, or the longer, more concealed path. The paths in the space now take on a different meaning, with a new sense of urgency based on the objectives of the game and the skill of the player.

With the addition of regular FPS combat and the competitive aspect of CTF in the UWSA, the implied, programmatic meanings of spaces are transformed in the VCTF-UWSA, from a space of fluctuating circulation, to a space of constant movement and strategy. Each configuration in the spaces, such as the organization of desks, to the position of a wall, changes within the magic circle of the game.

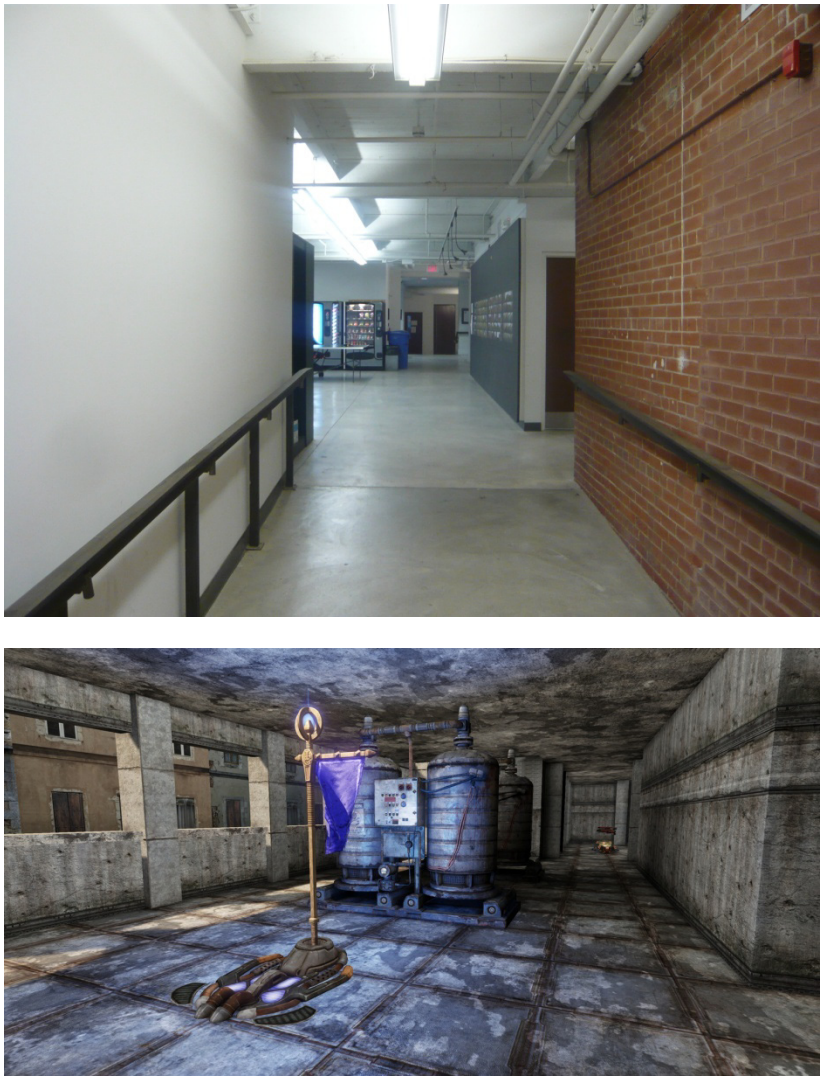


Figure 14-31: UWSA and VCTF-UWSA workshop entry

Figure 14-32: UWSA and VCTF-UWSA student lounge

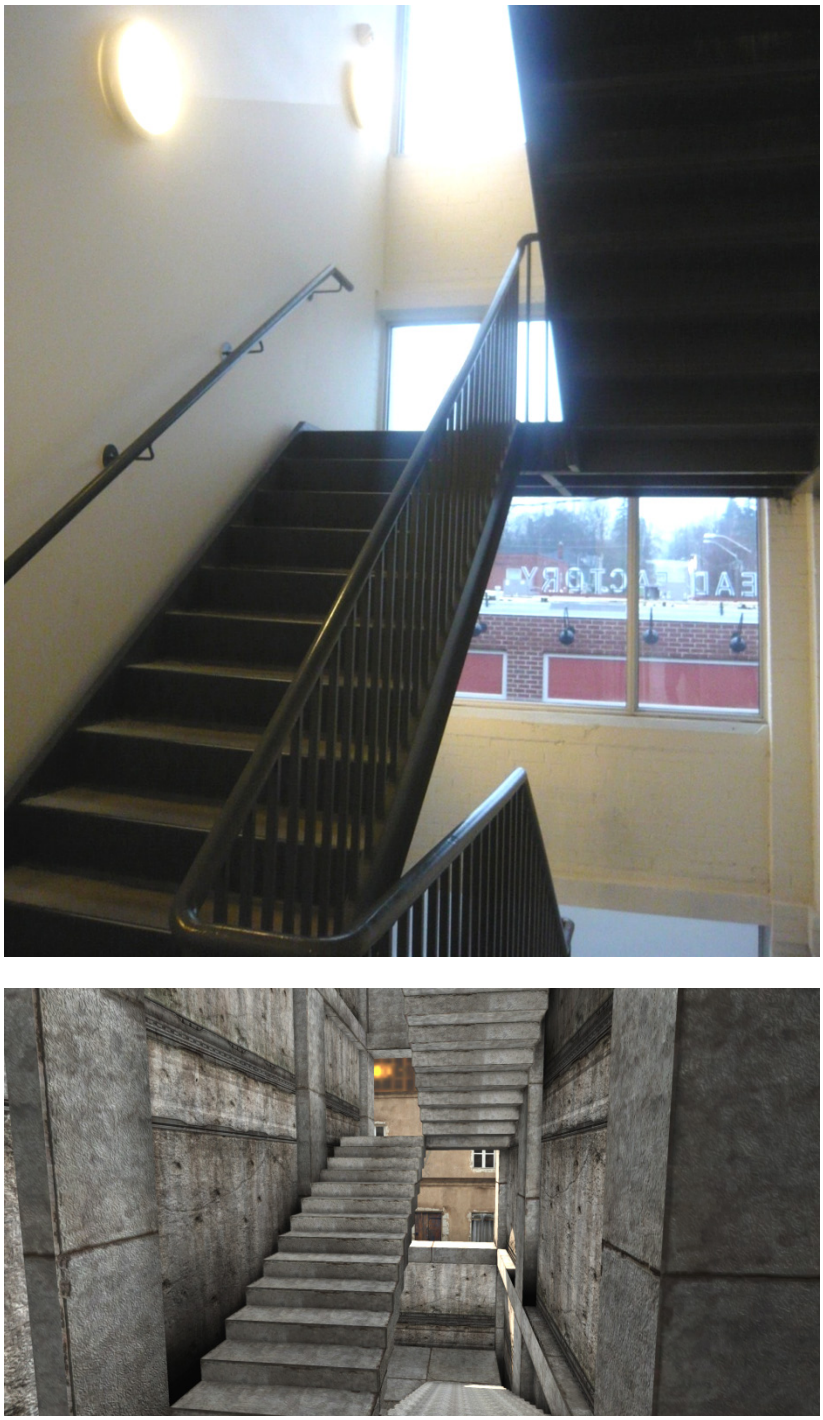


Figure 14-33: UWSA and VCTF-UWSA stairwell

Figure 14-34: UWSA and VCTF-UWSA lecture hall (photo by Ben Rahn)

Figure 14-35: UWSA and VCTF-UWSA atrium (ground floor)

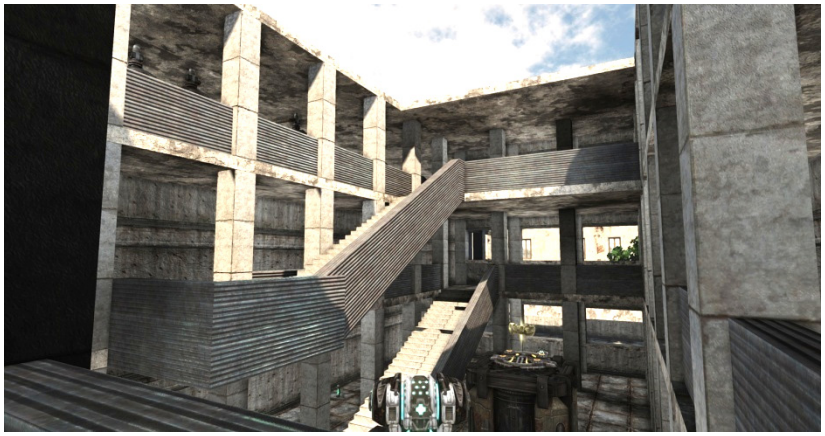


Figure 14-36: UWSA and VCTF-UWSA atrium (second floor)

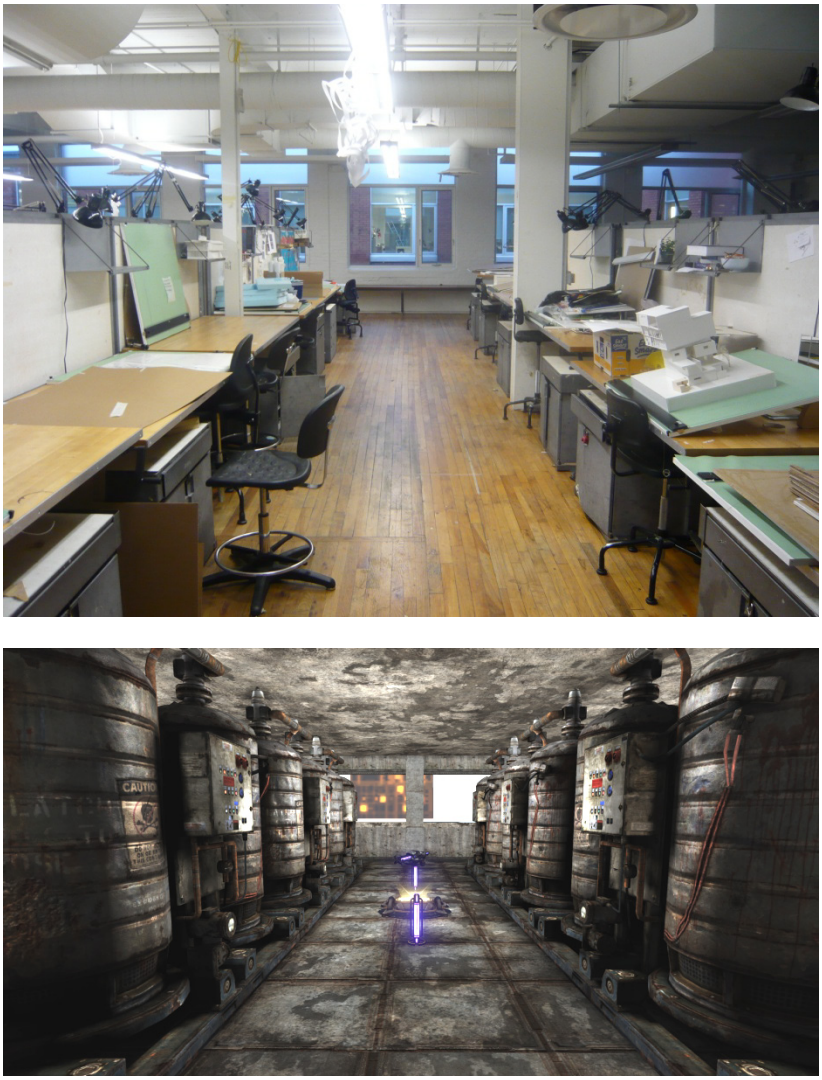


Figure 14-37: UWSA and VCTF-UWSA studio desks

Figure 14-38: UWSA and VCTF-UWSA studio

Figure 14-39: UWSA and VCTF-UWSA studio hall

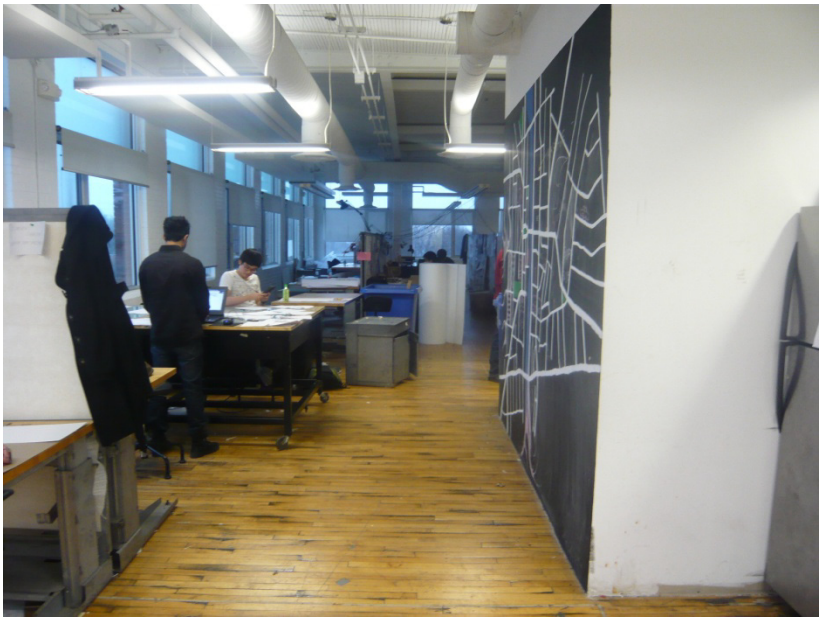


Figure 14-40: UWSA and VCTF-UWSA studio lounge

14.4.2 | FLOW AND FLAWS

The resultant VCTF-UWSA map is not perfect for flow. As mentioned before, professional game design involves rigorous testing and quality assurance before becoming a published game. After testing the game with other players, various flaws were revealed that were otherwise unnoticed by the author. However, it is possible to observe both the faults and successes of the map as a demonstration of how flow works in video game space.

Figure 14-41: VCTF-UWSA chance encounter

One of the main successes of the map is the overall spatial organization. The tight enclosure of the space ensures high player density and that chance encounters are frequent, allowing action to remain constant (Figure 14-41). The map is essentially a diamond shape, starting narrowly at the flags and expanded towards the atrium. As long as the player moves forward, they will reach the opponents flag. Furthermore, the overall symmetry of the level allowed for equal chances of success for both teams.

Figure 14-42: VCTF-UWSA flag runner encounter

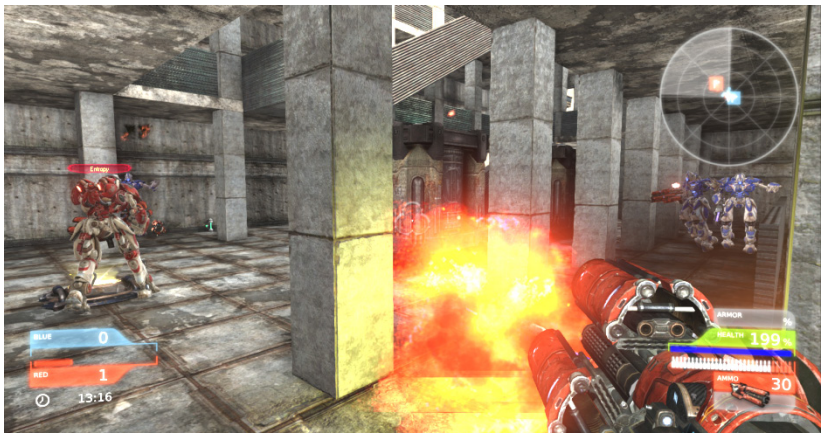


Figure 14-43: VCTF-UWSA atrium battle

As predicted, the atrium tends to contain most of the interactions, as it is the central junction between the two flag bases (Figure 14-43). The atrium allows for multi-level interaction, with battles often occurring between the ground and second floors. Players both familiar and unfamiliar with the school stated that the atrium was a natural space to gravitate towards and allowed them to move forward in the game. Players unfamiliar with the school found that the central atrium allowed them to orient themselves in space to find the enemy flag the first time. After multiple playthroughs, players were able to utilize the nodes in space to quickly memorize the map.

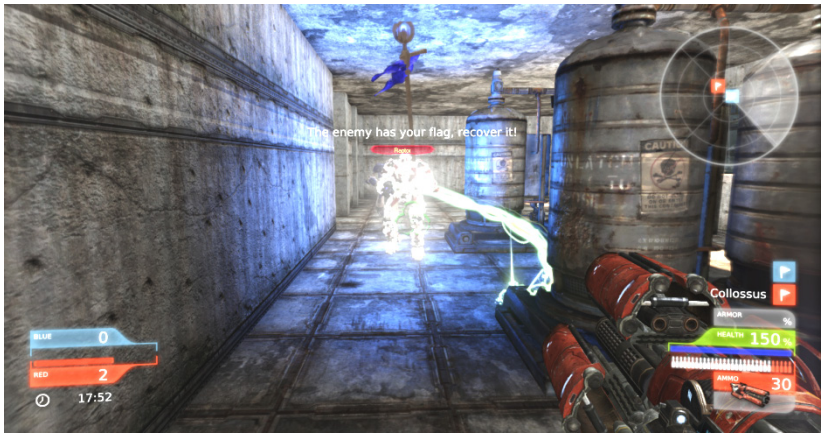


Figure 14-44: VCTF-UWSA blue flag captured

The inclusion of three means of entry into a flag base allows for multiple chances of flag capture, while the density of barriers before the atrium also ensures that the defending team can still stop the runner through surprise and ambush (Figure 14-44).

Figure 14-45: VCTF-UWSA red flag captured

Most of the issues with the map involve difficulties in orientation and snags to the flow of movement. When running with an enemy flag, agility through space is essential to escaping to the home base. While a player's skill contributes to this, environmental issues can slow a player down.

In VCTF-UWSA, the largest issue is the scale of certain paths in the map, such as the stairwell and the paths around the studio "desks". In general, the entire scale of the map could have been more generous to accommodate for more fluid movement. Many players became lost due to turning quickly in the tight areas, causing them to lose sight of reference points. While the purpose of the scale was to create a higher density of action and increase chance encounters, many players suggested that the map could be larger to accommodate a larger field of view for both orientation and sighting other players. Many players would have preferred an even larger atrium space. This would have allowed for both the players and flag bases to be more visible between floors.

Other issues involve being caught on smaller snags. This is exhibited in the map by the columns and pilasters. When clinging close to a wall for cover, the player can become stuck, requiring more movement to escape (Figure 14-46). If the player became stuck on one of these pilasters, an enemy would have an easy time picking them off. The tightness of the stairwell also caused some players to become stuck and slowed down. While these issues could be solved through programming to preserve the forms, using collision detection to create an invisible smooth surface over the pilasters, it is a spatial detail that could have been avoided for flow.

Figure 14-46: VCTF-UWSA, current player weapon snagged on column

Other issues involve the efficiency of space. While not a complete hindrance to the game, there are some spaces in the game that were not as widely used as expected, becoming superfluous areas. Spaces such as the end of the atrium behind the main stairwell become dead spaces due to the lack of stairs (Figure 14-47). The auditorium stage was also rarely used since it required too much time to reach it.

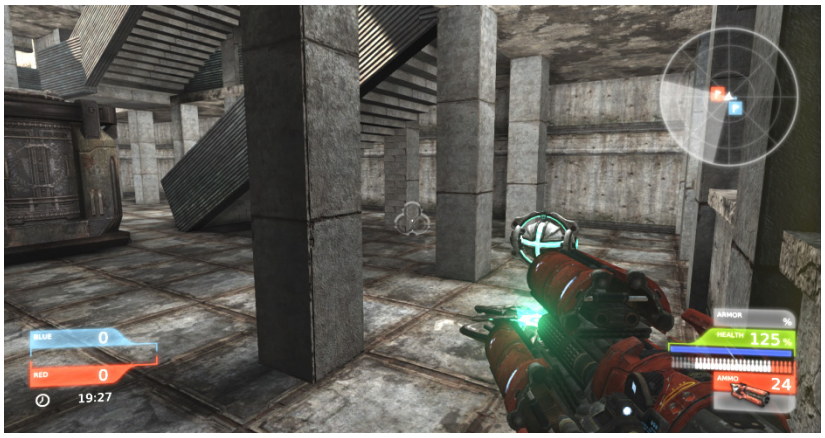


Figure 14-47: VCTF-UWSA unused atrium space

Many of the issues in the map arose from the intent to keep certain aspects of the UWSA, such as scale and formal style, recognizable and accurate to the base building. For example, views to the outside world were created to depict the surroundings of the school. However, many players would try to exit the building to explore, rather than capture the flag. Perhaps a more lenient approach to the design could have yielded a more flow-supporting map.

While there are many issues present in the map, it reveals examples of hindrances to flow that are harder to find in the polished, professional game spaces introduced in the case study section of this thesis. This is not to say that there are no badly designed games on the market, but for the most part, their issues arise from gameplay, narrative, and technical glitches, as issues in space are usually the easiest to catch during QA. This map serves as a personal and repeatable instance of both the success and failure of flow in space. The unforeseen issues generated by the design help strengthen the argument that video game space can contribute to the flow of a game depending on the effectiveness of its design.

Figure 14-48: VCTF-UWSA screenshots

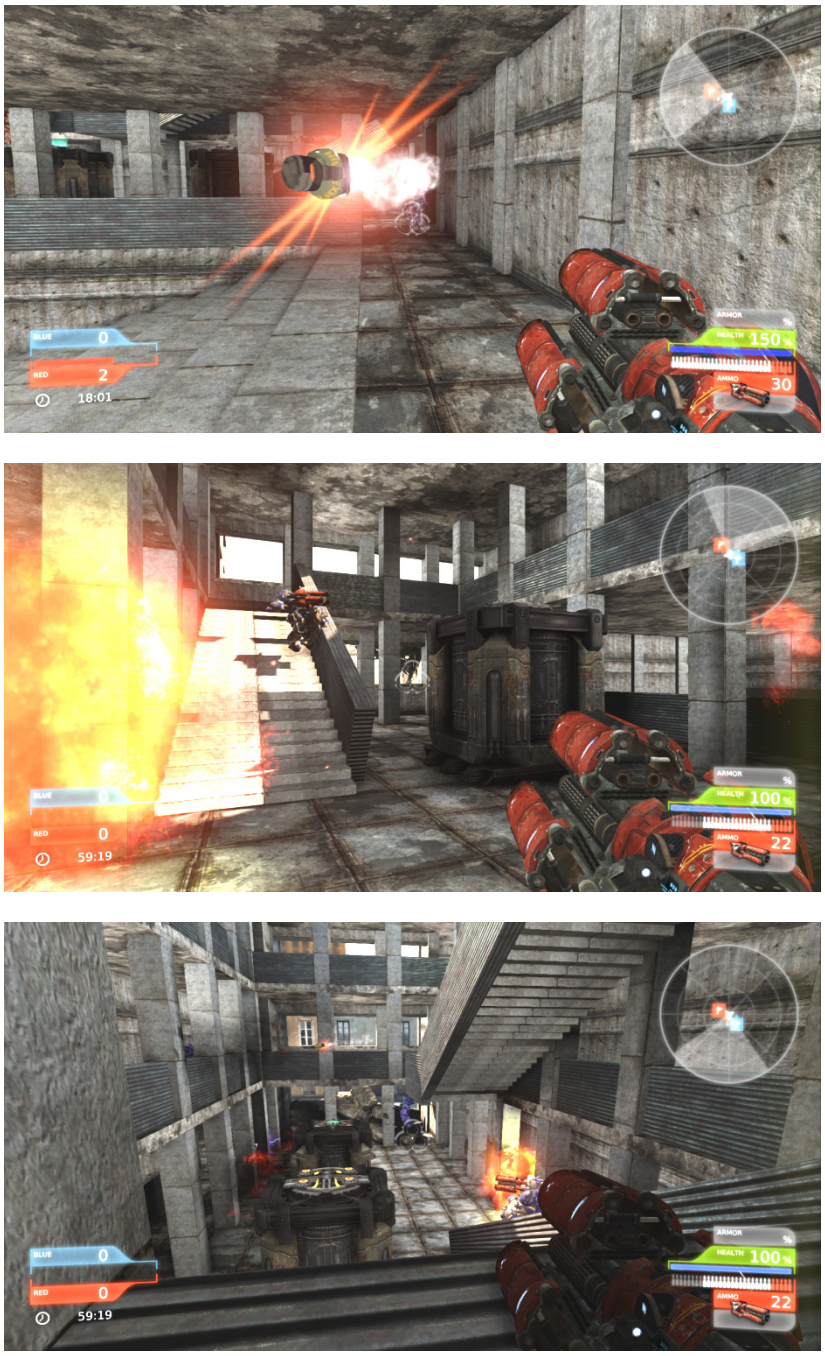


Figure 14-49: VCTF-UWSA screenshots

Figure 14-50: VCTF-UWSA screenshots

14.5 | VCTF-UWSA V2.0

After noting the observations presented by testers, VCTF-UWSA was redesigned and rebuilt to better accommodate flow. While the design could have also been retextured and remodeled to resemble the school more closely, this version attempts to demonstrate a flow space at its full extent. The magic circle as a concept is less of a concern in this iteration, as the first incarnation demonstrated the concept clearly. The overall spatial layout still remains the same with two headquarters feeding into a central atrium (Figure 14-51).

The main modification to v2.0 is the scale of spaces. Testers found themselves cramped in many areas causing disorientation when turning quickly. The goal was to create a more generous space that allowed for more open battles to occur. The flag bases are now more spacious to ensure that flag runners have ample space to have a chance of escaping. In order to balance the larger spaces of v2.0, crates are strategically positioned throughout the map as baffles for both movement and sightlines to enemies and items (Figure 14-52).

One of the main issues for players unfamiliar with the school was path finding and disorientation. While the shape of the enclosure would eventually lead them to the opposing flag, many players found themselves moving backwards or remaining in the atrium. To resolve this issue, details and textures play a greater role in v2.0, utilizing red and blue textures to notify locations of the flag. Simple white, black, and yellow textures (by Scott Coxhead) were used in contrast in order for players to focus. Details and set pieces from the previous iteration were removed to help players stay on task. Furthermore, the layout of the map is even more symmetrical to allow players to be instantly familiar with the spaces, no matter what team they are on. Each flag base is a mirror image of the other, including the atrium stairs.

In terms of gameplay, v2.0 takes more advantage over game items to balance the gameplay between teams. The atrium at ground level features two “jump pads” that allow players on the blue team to quickly reach the third floor, similar to the dynamic of jumping down to the ground floor available to the red team (Figure 14-54). This allows for both teams to have an equally fast, yet exposed route to the other base. Items (armor, health, weapons, and ammo) are spread out further from the flags based on their power. “Power-ups” (super health, increased damage and speed, and shield belts) are all placed on the second floor, ensuring that both teams are equidistant from them (Figure 14-55). The placement of these objects promotes exploration of all spaces of the map and balances the gameplay.

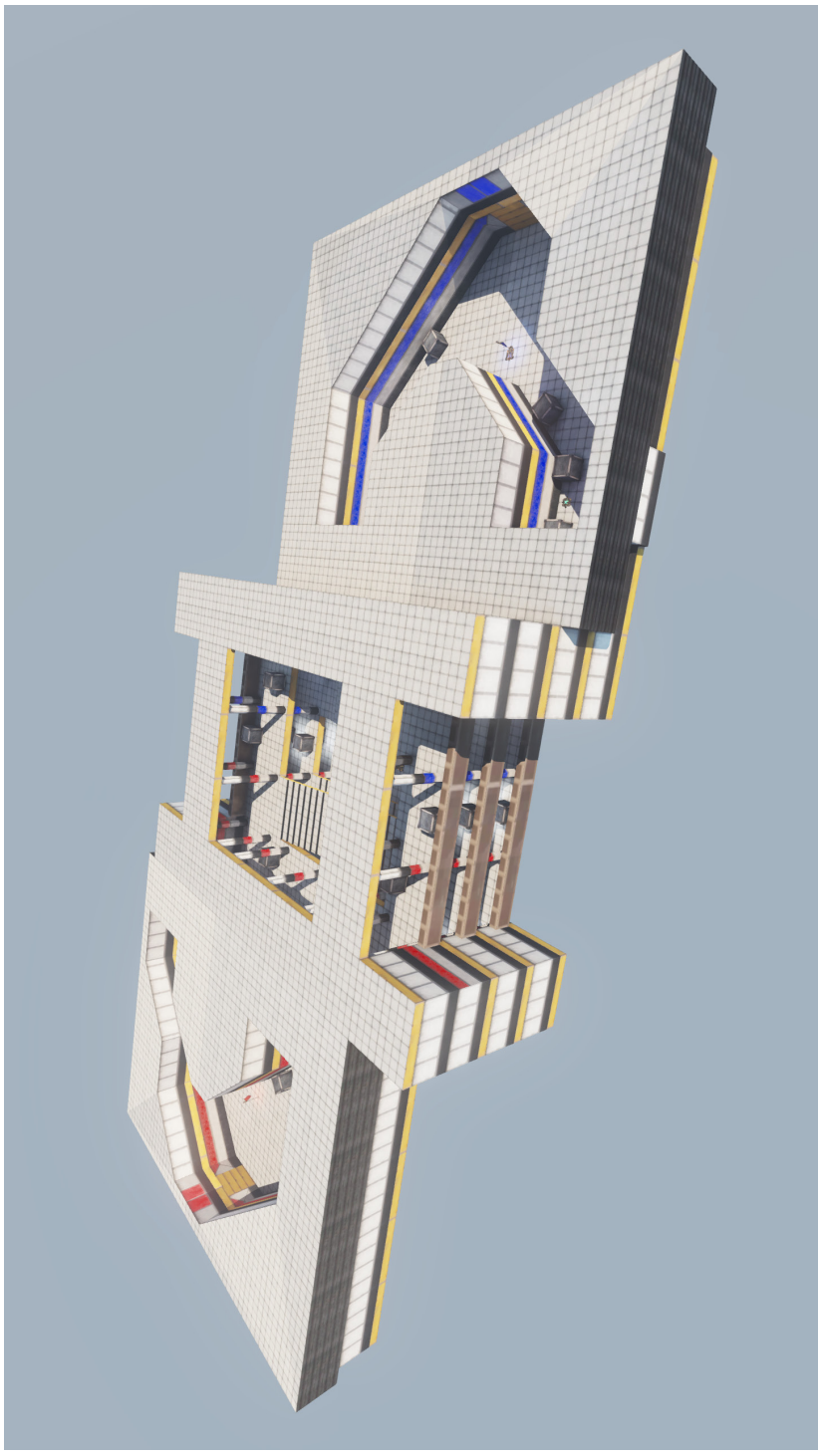


Figure 14-51: VCTF-UWSA v2.0, textures by Scott Coxhead

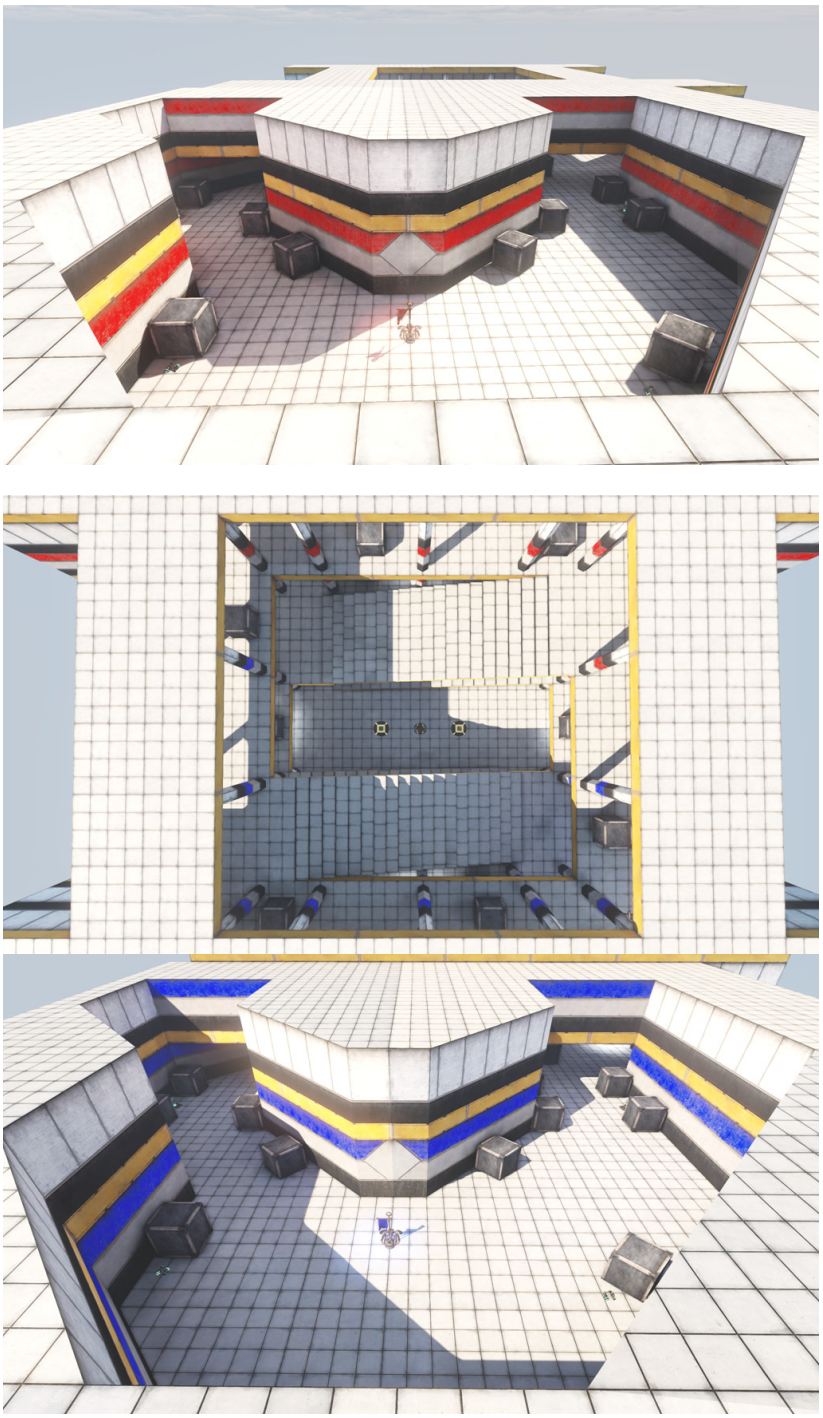


Figure 14-52: v2.0 Bases and Atrium

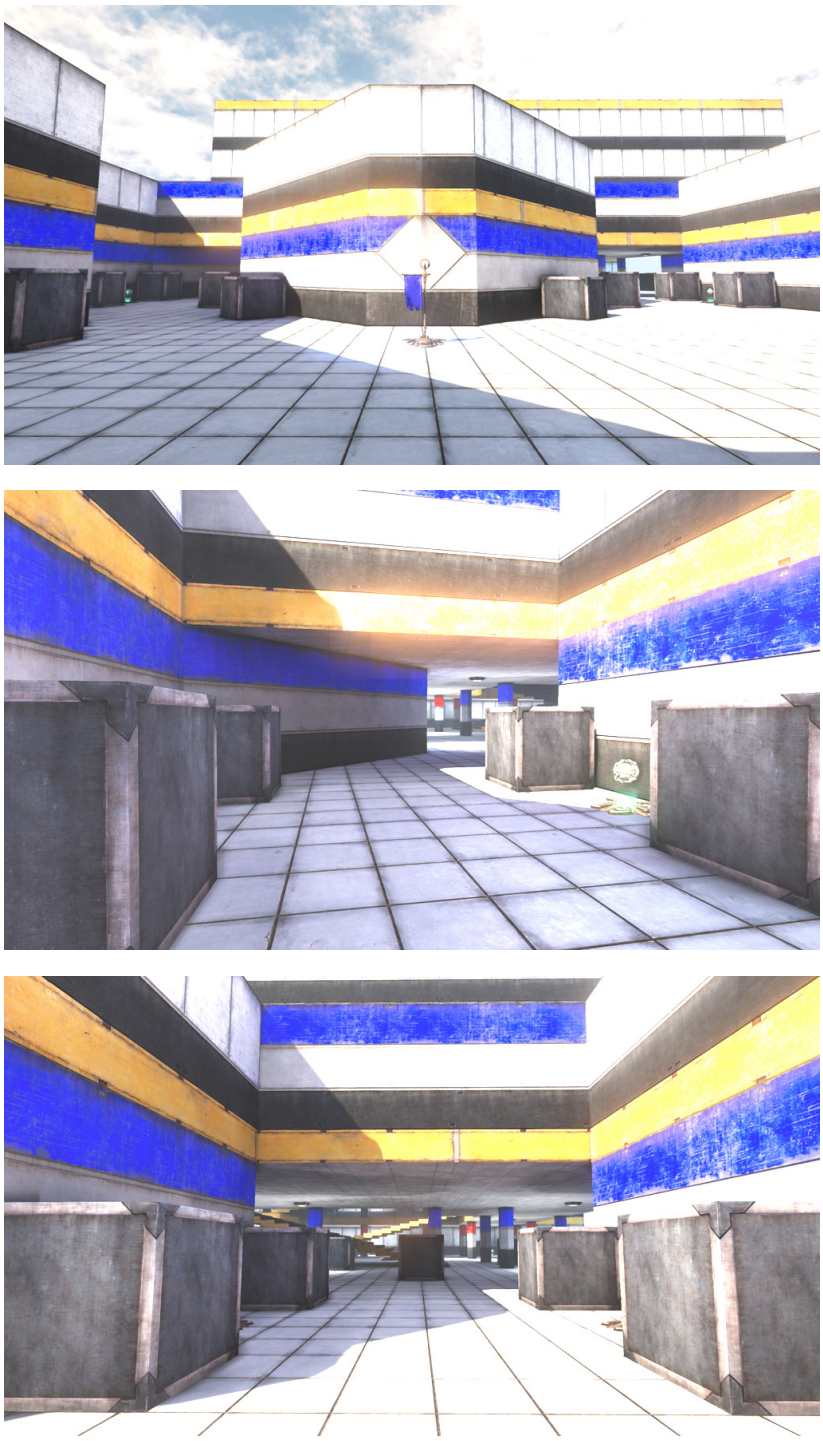


Figure 14-53: v2.0 Blue Base

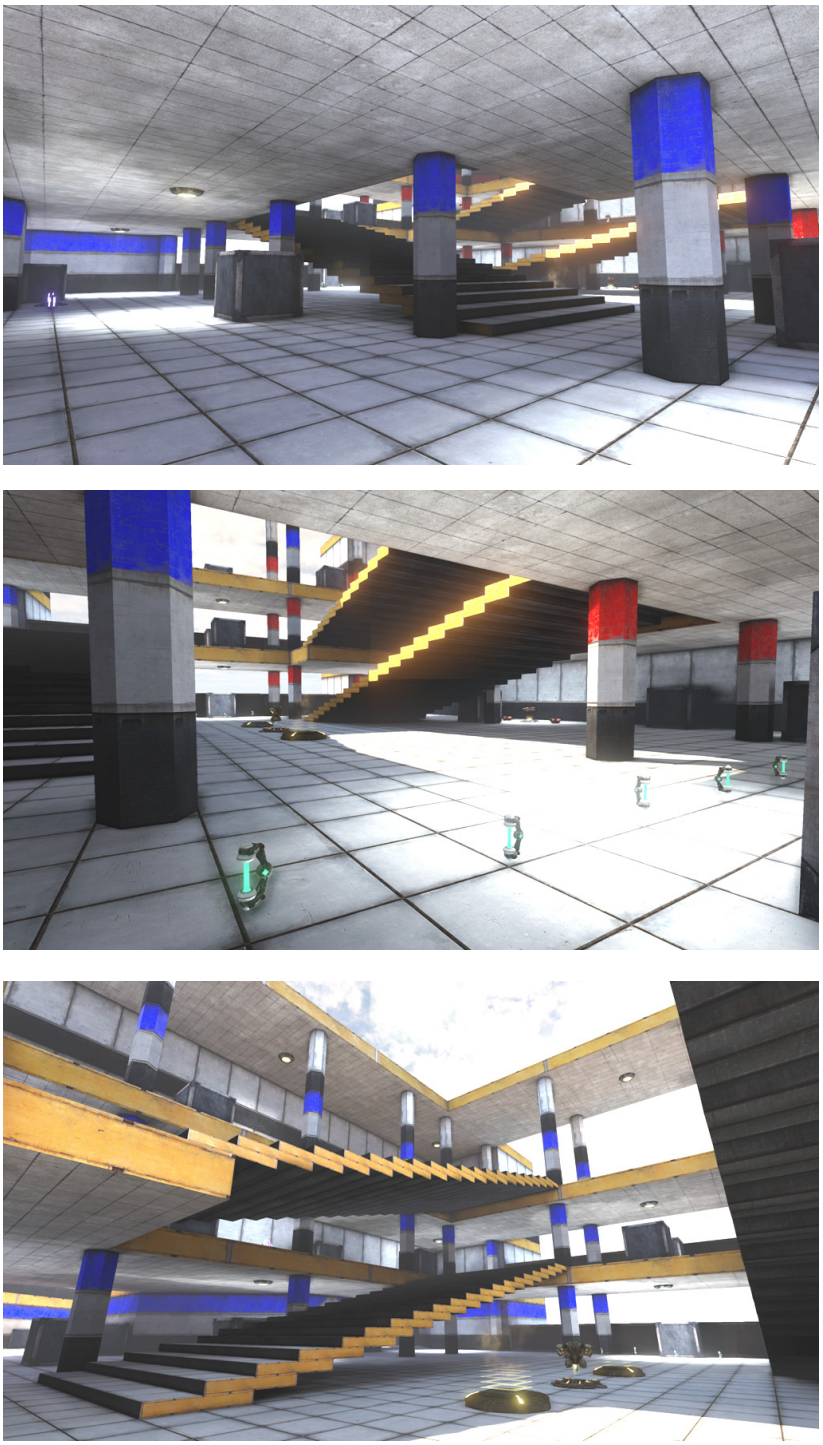


Figure 14-54: v2.0 Atrium, Ground Floor

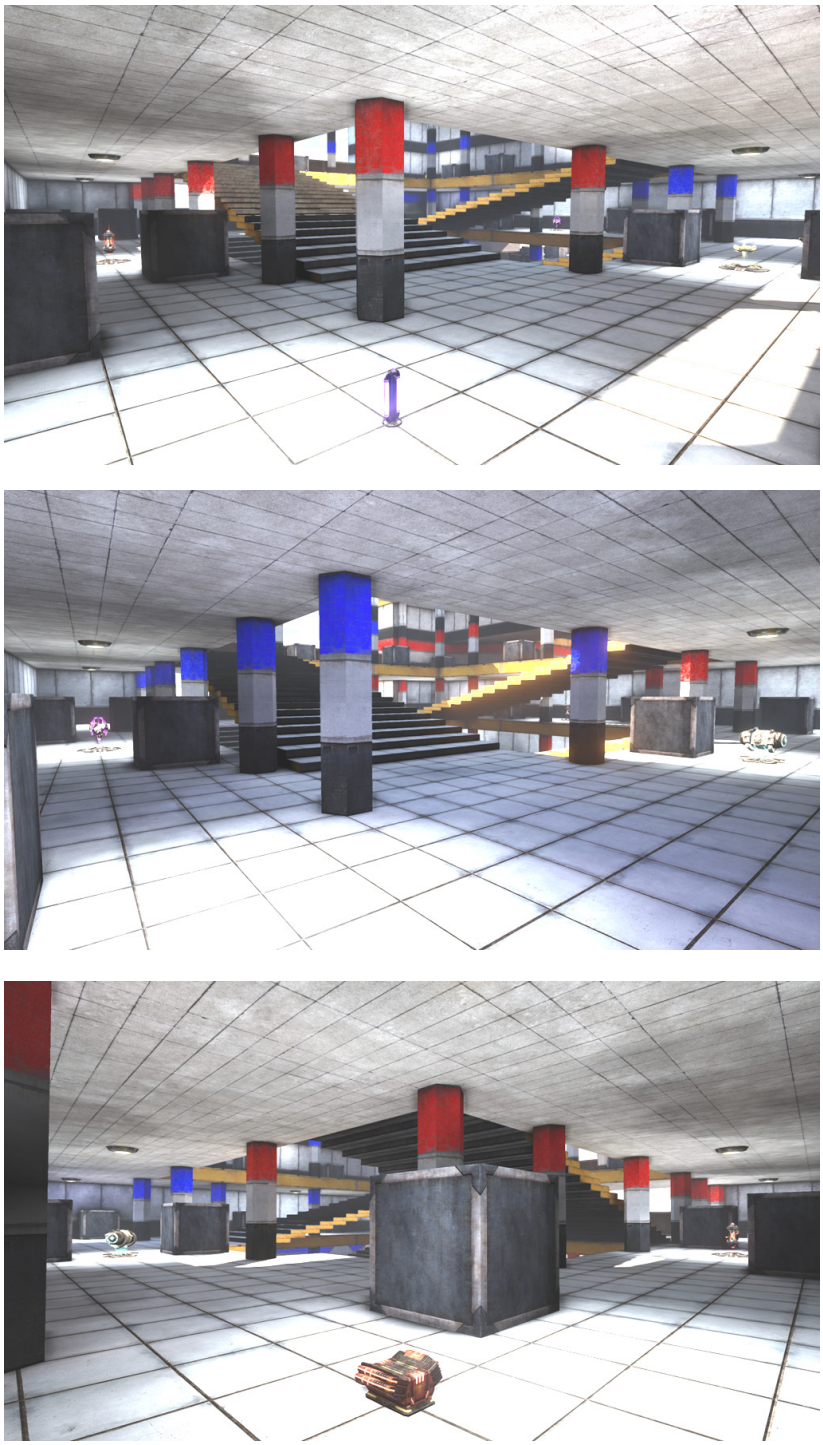


Figure 14-55: v2.0 Second Floor, "Power-ups"

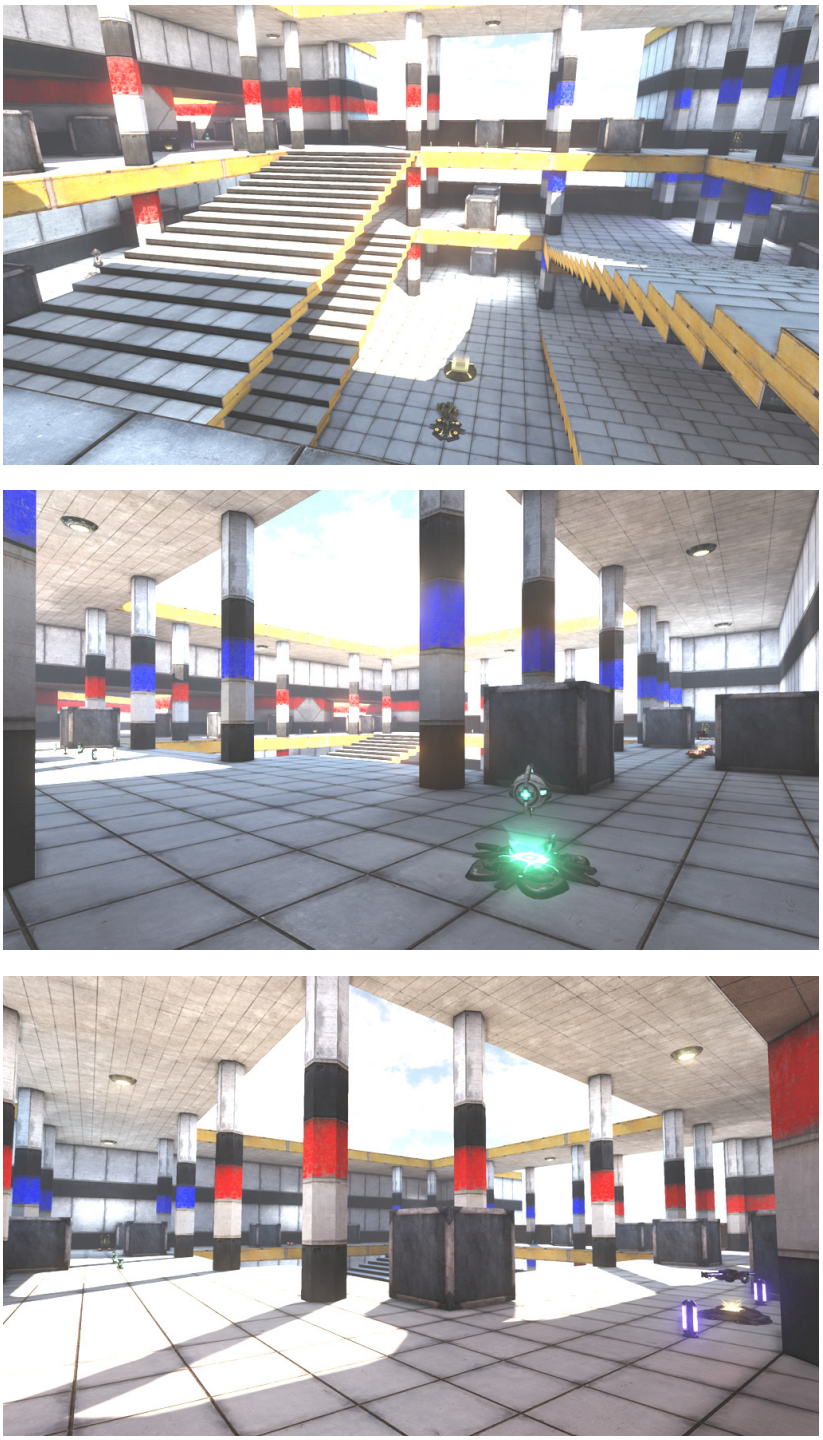


Figure 14-56: v2.0 Atrium, Third Floor

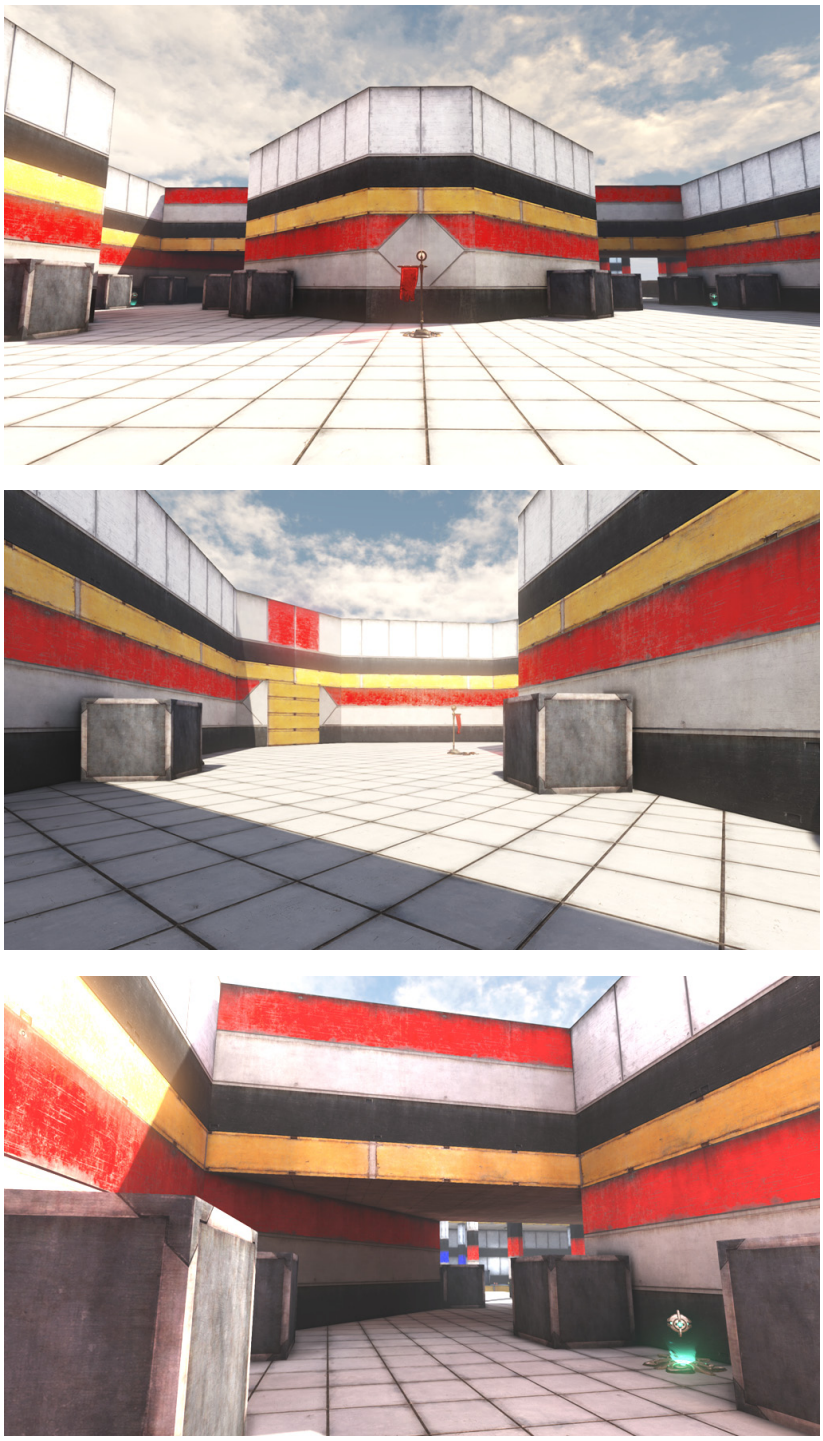


Figure 14-57: v2.0 Red Base

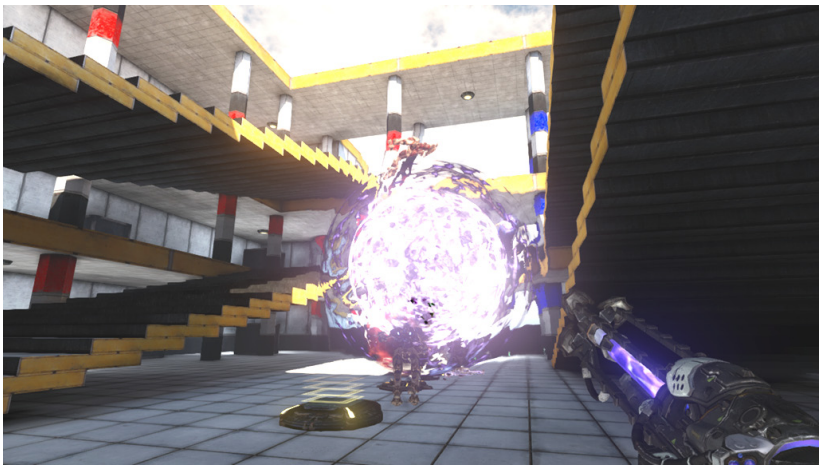


Figure 14-58: An explosion in v2.0's atrium

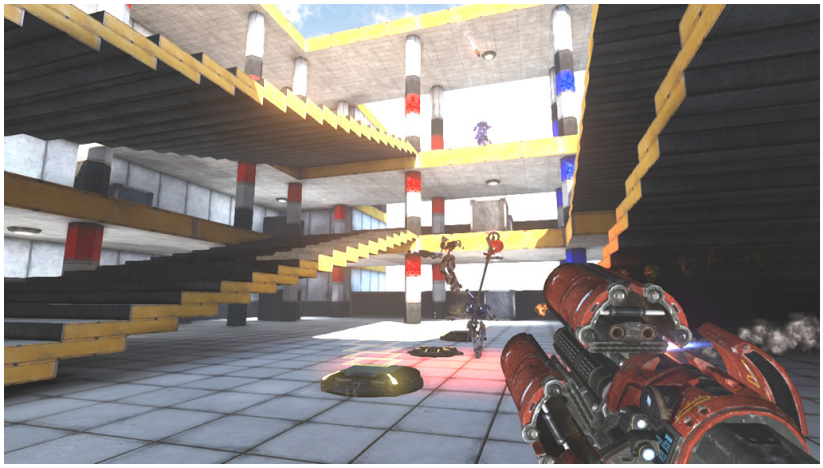
The same players that tested the previous version were used again to test v2.0. All of the testers found that v2.0 made for a much more enjoyable gameplay experience. The general openness of the space allowed for a greater variety of strategies and tactics for gameplay. Wider halls with staggered crates created more skirmishes in smaller areas around the atrium, rather than just in the centre. Many players also noted the removal of railings from the space, which allowed for a greater flow of acrobatic movement between floors. The lack of railing also provided a greater contrast between cover and exposure, creating a faster, more dynamic urgency to movement.

Players unfamiliar with the school found the open spaces and simplified textures to be a great help to orientation in space. They were quickly able to assess their position in space, allow their flow state to remain intact. Even players familiar with the school found the enlarged space to be more orienting, allow players to focus more on the gameplay.

Players also appreciated the new placement of items, giving them reasons to travel to all corners of the map in order to succeed. These new positions also balanced the challenge of the game by creating a greater distance and more obstacles in the way of reaching more powerful items such as the rocket launcher or power-ups. This ensured that players were not too powerful early on in the game. The jump pads also allow both teams to share an equal range of movement between floors. In general, players found this new space to be more balanced for both teams to have an enjoyable experience.

While the map was a better experience overall, players still had some issues with the space. Some players would have liked to see more cover and variation within the flag bases to allow for a more stealthy escape with the flags (since players spawned at the flags this was also a technical issue). Others found the stairs to be too wide, blocking views of the jump pads and incoming players. Many players familiar with the school also found that some of the charm created by the proxy to the school's design was lost in this iteration.

As a whole, v2.0 is a clear example of space assisting in maintaining a flow state of a game. It also demonstrates how player input is extremely important to the creation of effective game spaces. If this process was to continue, there could be a perfect balance between an accurate recreation of the school and the creation of an effective flow space, leading to complete example of both the magic circle and flow that professional game designers already create.



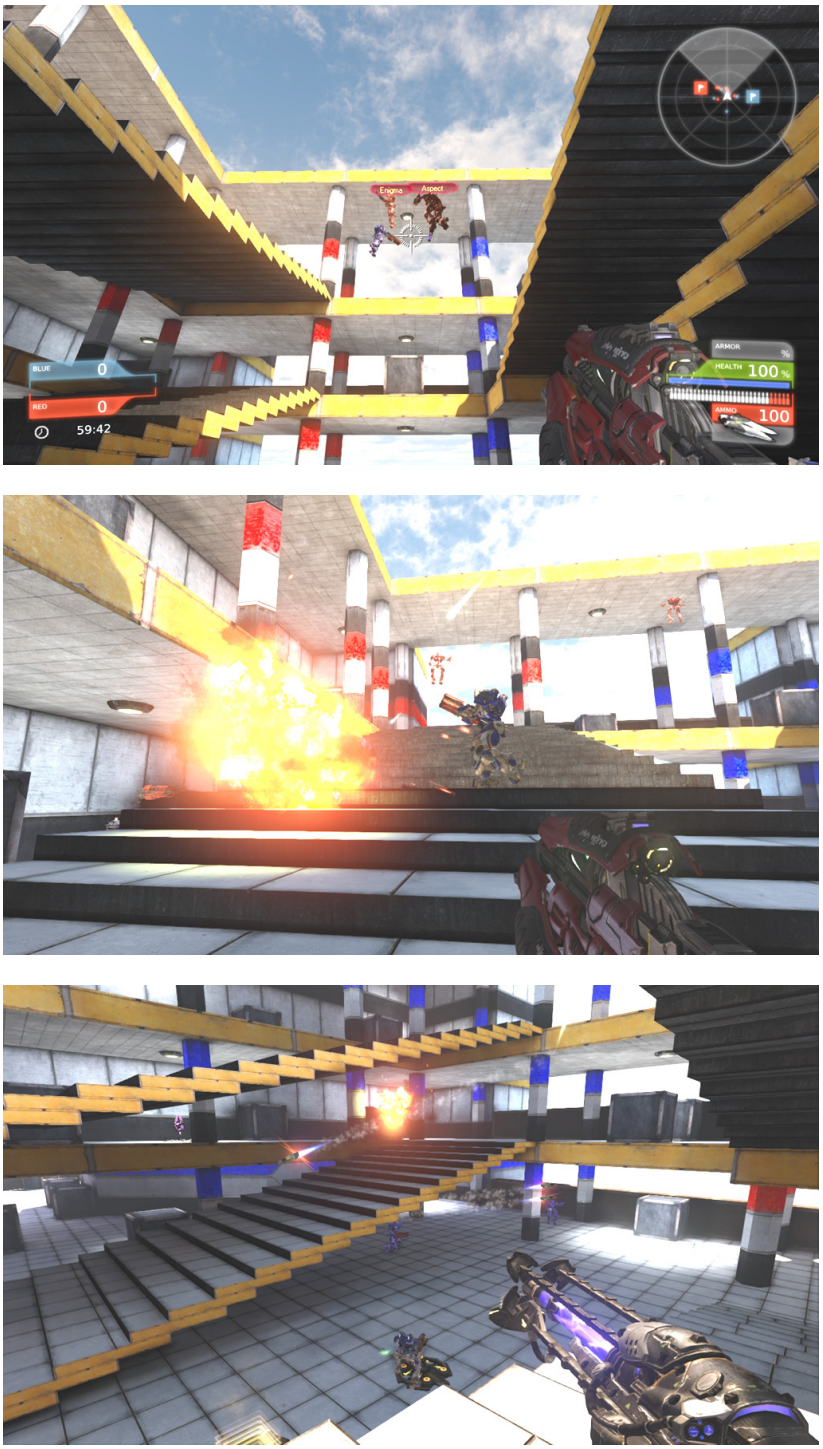


Figure 14-59: v2.0 Screenshots

15 | CONCLUSIONS AND INSIGHTS

15.1 | SUMMARY

In summary, this thesis observed and analyzed video games, specifically the first-person and third-person shooter (FPS and TPS) genres, through the paradigm of space, in terms of the transformation of spatial meaning within the magic circle by the rules of play and the creation of flow through spatial design. Firstly, this thesis defined the terms magic circle (the boundary between the real world and the fantasy world of play), and flow (the psychological state in which tasks become autotelic due to the balance of skill and challenge), as well as the conditions needed to generate them.

The thesis then observed how video game designers create both these states through gameplay and narrative. The thesis introduced the concept that both the magic circle and flow are also present through the spatial of design of video games. In more detail, the thesis observed how the meaning of spaces can change with the introduction of gameplay. Flow can be supported by spatial design through the implementation of nodes, barriers, paths, enclosures, challenges, and balance. A brief section also introduced the importance of details as a final touch to the gaming experience. Four varying case studies were observed to demonstrate the presence of both the magic circle and flow in video game spaces.

Lastly, a CTF map was created based on selected areas of the University of Waterloo School of Architecture in order to express the concepts introduced in this thesis. This design synthesis also resulted in the demonstration of some ineffective spatial modes that hindered the flow of the game. This allowed for a comparative analysis of effective game space design. Using information gathered from game testing, a second iteration was created that exemplified an effective flow space. As a whole, this thesis presents the uniqueness of video game space and the merits of well-designed space in video games. To close this thesis, the following sections present future discussions on the concepts introduced in this thesis, as well as some concluding statements.

15.2 | POSSIBLE SPACES

This thesis introduced a set of spatial characteristics that can contribute to the creation of flow and enjoyable game experiences. It then observed these characteristics in a series of case studies in order to illustrate their implementations in an overall organization. However, this thesis did not offer any specific organizations of these characteristics into an overall geometry. While every game requires its own organizations due to the needs of gameplay and narrative, it is possible to recognize some geometrical matrices that embody play spaces.

The church still provides an effective spatial metaphor for single player spaces, with a linear organization that accommodates an overall, larger narrative, as well as smaller, more personal journey. From On the Border (

Figure 15-1):

> A gathering for mass at St. Basil's creates a large group oriented equidistantly from each other, along a common axis. The community along with a leader who stands apart, progress along this central axis.
>
> Smaller shrines and the stations of the cross located on the periphery of the sanctuary create a secondary sequence of motions. This path is a cyclical, personal journey which consists of an individual walking privately, following a visual narrative. The path is both personal and communal as the path and narrative are integral to the community as a whole.[97]

The nave, aisles, crossing, transept, and ambulatory are all nodes and paths arranged in a linear organization within a narrow enclosure. Single player spaces can be viewed as elongated and deformed versions of the church, creating longer spatial journeys with the aid of narrative and gameplay.

[97] Nicholas-Schmidt 2009, 25

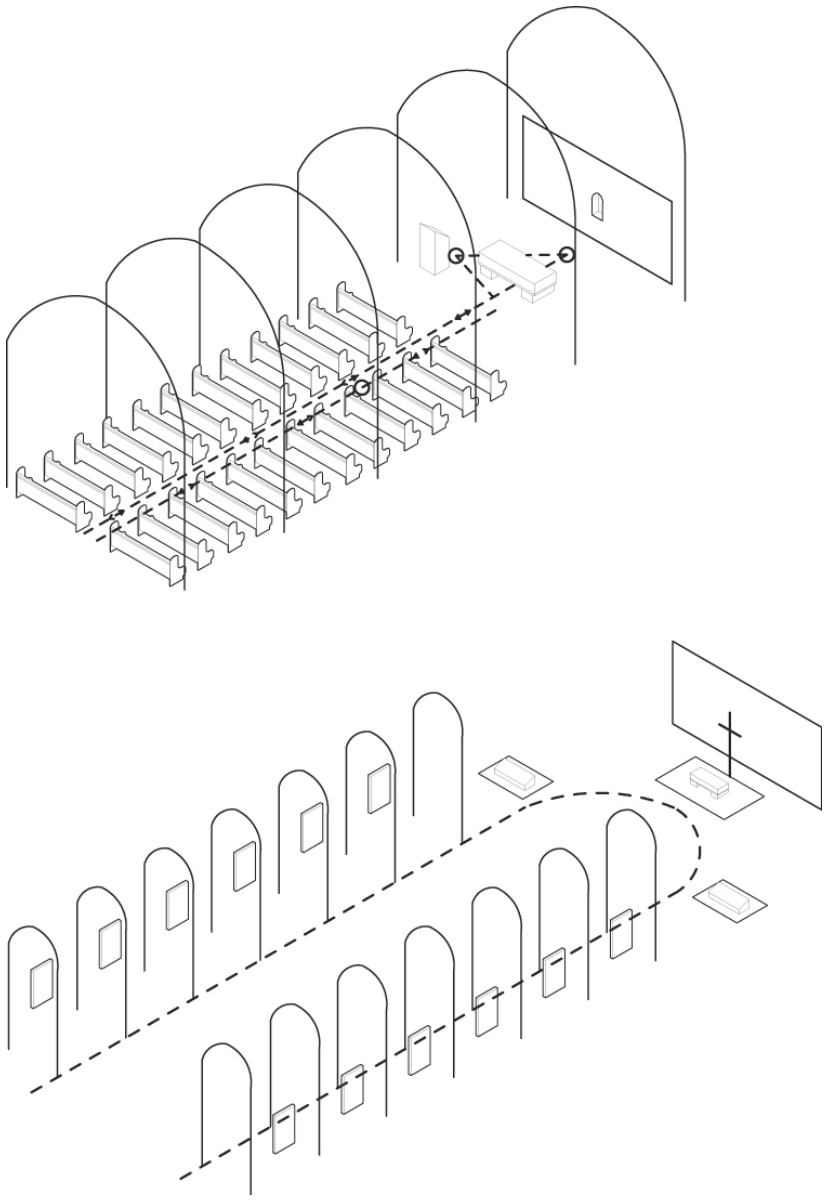


Figure 15-1: St. Basil's Church, Michael Nicholas Schmidt

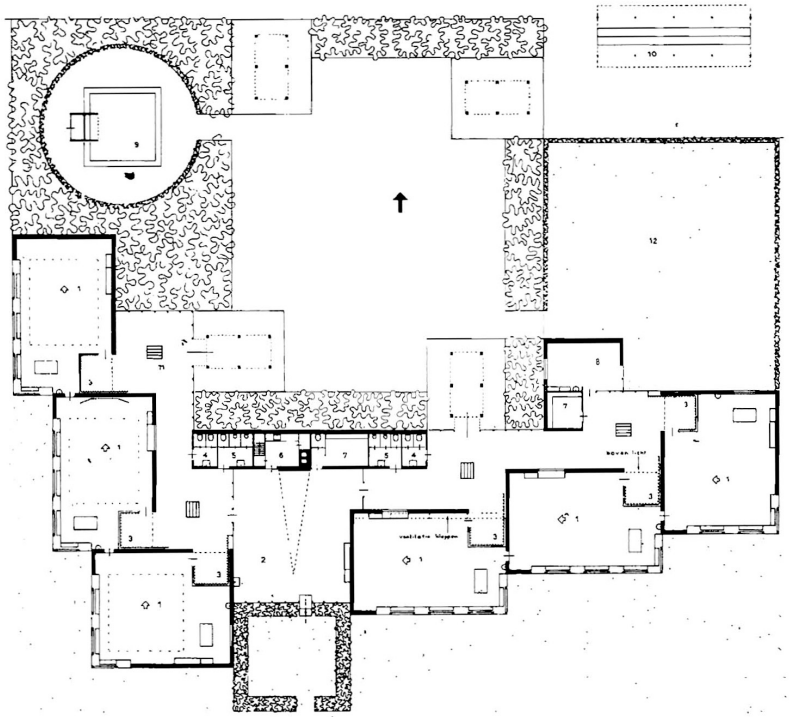


Figure 15-2: School in Nagele (designed 1954-55, built 1955-56)

The key to most multiplayer shooter spaces is the facility for movement at the scale of the player. Again, the work of Aldo van Eyck, as well as his Team 10 compatriots, provides architecture analogous to the spaces of video game shooters. Van Eyck's earlier orphanages in Nagele utilized a centrifugal, or "windmill pattern" (Figure 15-2), that was later developed in the Amsterdam Orphanage.

> The centrifugal character of the pattern moreover establishes a contextual relation. It evokes movement towards the places that surround it. It forges a link both between different levels and between spaces at the same level. The halls, whose 'windmill sails' (the cloakrooms) penetrate and interlock with the classrooms – an effect accentuated by variations in ceiling heights – thereby couple the classrooms both to one another and to the exits.[98]

[98] Strauven 1998, 281

Van Eyck organized paths around nodes that allow for continuous circulation around a central space. Circulation is free from room to room, opposed to a linear path.

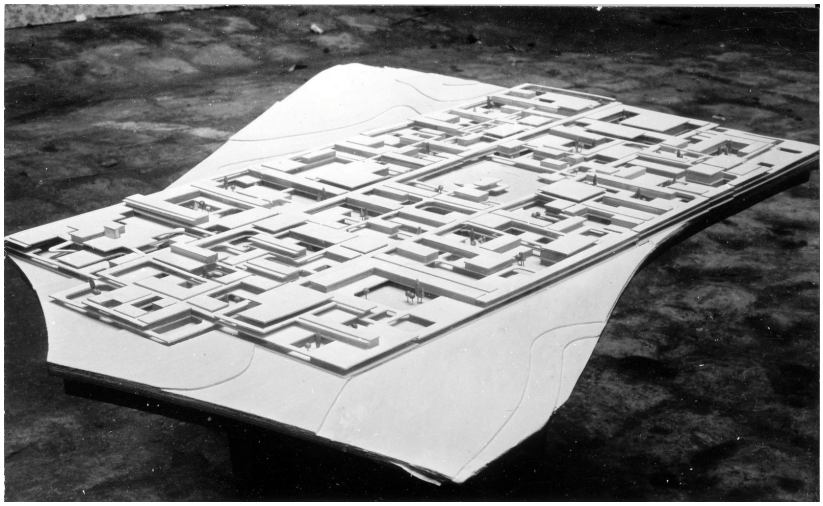


Figure 15-3: Free University Berlin, Competition Model, 1963 (Candilis Josic & Woods)

The tartan grids of Team 10's "mat buildings" also provide a general spatial matrix for video game maps. Projects such as the Free University of Berlin (1963-73) by Candilis Josic & Woods (Figure 15-3) and Le Corbusier's Venice Hospital design offer an architecture that is "both city and building, both public and private, both structure and infrastructure"[99]. Spaces are organized using corridors or streets that intersect, overlay, and enclose courtyards, auditoriums, and other program. They are low-rise and high density, using repeated modular languages that result in a "disintegration of rigidity"[100].

Translated into game spaces, both the centrifugal plan and tartan grid of the mat- building are organized in a way where all spaces can allow for constant movement and chance encounters, while maintaining whatever iconography the game requires. Nodes and paths become very similar, while enclosures and dead-ends become one. These overlapping organizations create a constant flow of movement, which in turn maintains the flow of a game. These spaces encourage the player to move.

[99] Sarkis 2002, 15

[100] Smithson 1974, 575

The idea of the mat-building during the 1950's and 60's was to create a symbiosis between the contrasting worlds of architecture and urbanism:

> What underlay it was a romanticism about the kind of social life made possible in such places, which in the contemporary developed world appeared to be in retreat. Forms that had developed for societies with limited technical means, organized according to rigid religious and guild patterns, were reinterpreted as new fields for a more imaginative urban life, one based on a Ruskinian vision of energized citizens constantly interacting in creative ways in their new urban structures.[101]

Video game spaces however, may offer these spaces in their purest form. When describing mat buildings, Allison Smithson described a certain suspension of skepticism required to read them. On the Berlin Free University:

> We don't resist the fire doors (which ruin, Schiedhelm claims, the corridor streets); the problematic detail can be brain-washed out of what one is trying to *get* from the FU...again wearing protective-visual-clothing in order to see what might be there; what might be in it for us.[102]

Video game spaces do not need "protective-visual-clothing" to be read once inside the magic circle, as they allow spaces to be designed only under the restrictions of the game and the technology used to make them. Video game spaces blur the lines between interior and exterior; built and natural; structure and infrastructure. The magic circle allows architecture to become urbanism and vice versa. Due to the endless possibilities of digital space, video game spaces may offer the most succinct iterations of both narrative and urban social spaces in architecture.

[101] Sarkis 2002, 64

[102] Smithson 1974, 574

15.3 | AMATEUR ARCHITECTS

This thesis has not even mentioned the concept of modding and sandbox design games. In all the examples presented in this thesis, the spaces were designed by professional game designers that have either learned their craft in school or through years of work experience. However, those who did not go to school for video game design may have started by modding. Modding is the act of modifying (hence the word "modding") existing game engines in order to create an entirely different experience than the original game intended. These "mods" are sometimes just an original map or some new weapons created for multi-player. Other mods completely overhaul the engine, changing the entire concept of the game into an original game.

Figure 15-4: Counter-Strike

One of the best examples is *Counter-Strike*. In 1999, using the original *Half-Life Source* engine, college students Minh "Gooseman" Le and Jess "Cliffe" Cliffe turned the sci-fi survival horror game into a tactical multi-player shooter involving teams of terrorists and counter-terrorists rescuing hostages or defusing bombs (Figure 15-4). This mod turned into a gaming phenomenon and is used in competitive gaming circuits as their game of choice, due to the skill required to play. Eventually, Valve Corporation, the creators of *Half-Life,* hired Le and Cliffe full time, and bought the rights to *Counter-Strike*. In 2012, the fourth *Counter-Strike* game, *Global Operations* will be released. Without any professional game design or spatial design knowledge, two college students were able to create one of the most popular games in the

world that relies very much on space. It was through their experience with games and playing countless hours that allowed them to understand space, and gave them the ability to shape space effectively.

Figure 15-5: Halo: Reach "Forge Mode's" premade components

Similarly, some "sandbox" modes in video games such as *Second Life*, *Garry's Mod*, *LittleBigPlanet* or *Halo Reach*'s "Forge mode" (Figure 15-5) are built upon online communities of gamers creating entire virtual worlds from premade game components. These games allow for players to create their own maps for games and even invent new types of gameplay modes. While not everything created by these gamers is as polished or effective as *Counter-Strike*, these games provide a safe outlet for non-architects to create and explore spatial designs without the risk of harming anyone physically or financially. On the other hand, an architect spends years in school and the workplace in order to be accredited to create buildings and spaces for people to inhabit. This is not to discredit the education of the architect, but to point out the amazing accomplishments in spatial design created by both professional and amateur game designers. They have been able to shape entire spatial worlds that aid in the narrative and play of games, keeping players happy for hours on end.

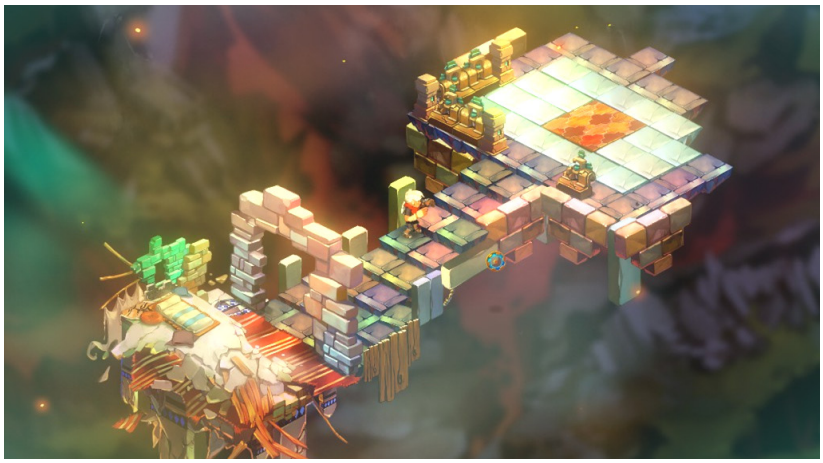


Figure 15-6: Bastion

15.4 | IMPOSSIBLE SPACES

While this thesis has focused on games that are fairly grounded in our regular conceptions of architecture, using buildings, cities, and landscapes as spatial bases, the fact of the matter is that video games can allow for architecture to exist at a completely different level. As *Portal* has already demonstrated, gameplay design mechanics can allow for a complete reimagining of space, creating spaces akin to M.C. Escher, without all the paradoxes. In *Shadow of the Colossus*, the goal of the levels are no longer to defeat hordes of enemies to reach a final boss; each level is a boss, a giant monster wandering the landscape that the player must find, scale, and defeat by attacking its weak points. In a sense, the architecture in the game is a living creature (Figure 15-7). In the upcoming game *Inversion*, players are able to manipulate gravity itself, allow them to walk on walls, ceiling, and generally changing the plane of travel. In the game *Bastion*, spaces are revealed to the player through a narrator that describes the player's actions and impending events (Figure 15-6). Although not a FPS or TPS, this inventive game provides a glimpse into the future possibilities of space and narrative. As game developers continue to try to find new ways to impress and challenge players with game mechanics, the resultant spaces will surely bend the preconceptions of architectural space.

Figure 15-7: Shadow of the Colossus (note the player on the sword)

15.5 | ARCHITECTURE AT PLAY

Video games are not going away. With no signs of slowing down, the video game industry will continue to grow and infiltrate culture. As the industry continues to grow, it is important for architects to understand that many video games are designed spatially and merit attention from the fields of architecture, interior design, and urban planning.

This thesis does not posit that architects can make better games, or that game designers can make better architecture. This thesis is merely an attempt at understanding the architectural value of video game spaces. Video game spaces are very different from real-world spaces, even though they may share the exact same spatial formats and organizations. It is the fact that they are a part of a game that transforms these spaces into entirely different environments. It is the game and its rules that define the space in play. However in order for a game to be truly enjoyable, the space itself should be appropriate for the games mechanics and narrative. If the space challenges the player too much or too little, or if the space is incongruous to the game's narrative, the game can become unplayable. These are the concepts that this thesis has attempted to bring forth with the terms magic circle and flow, concepts that are not usually associated with architecture but have found their way into game design.

While this thesis distances itself from the architecture of the real world, the study of video game spaces can also provide insight into physical spaces as they relate to games and flow. Motion-control video game systems such as the Nintendo's Wii, Microsoft's Kinect, and the Sony Playstation's Move are allowing for the magic circle to move beyond the screen and into the living room. As games continue to grow out of conventional means and break into the physical world, it is important for architects to understand the effects of video games and their rules on space as demonstrated by this thesis. With augmented reality games (ARGs), transmedia and gamification becoming more prevalent in marketing campaigns, art, and education, future architects may one day need to design for both the realities of the physical world and the parallel magic circle that can exist at any moment. If or when this architecture is designed, it will also be up to the architect to understand the characteristics flow in order to create spaces that assist in the creation of enjoyable and meaningful play experiences. The hope of this thesis is to let architects know that there is a unique world of architecture in video games that has brought joy to its visitors just as much as the built world has, if not more.

> A game is an opportunity to focus our energy, with relentless optimism, at something we're good at (or getting better at) and enjoy. In other words, gameplay is the direct emotional opposite of depression."[103]

Figure 15-8: Assassin's Creed: Brotherhood

[103] McGonigal 2011, 28

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