

STREET SKATEBOARDING MITIGATION THROUGH STRATEGIC LANDSCAPE
PLANTINGS

By

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ABSTRACT

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Bent handrails, wax covered ledges, and chipped concrete are just a few of the common damages that are far too often the consequence of street skateboarding. Too many public properties have been damaged, trespassed, and plagued by street skateboarders as they use urban architecture and amenities to perform skate tricks on. These areas are not designed for skateboarding and often suffer the consequences as street skateboarders use urban spaces for sport. The purpose of this research is to shed light on the ongoing conflict that occurs between street skateboarders and urban public spaces and to propose design solutions utilizing strategic landscape plantings aimed to deter street skateboarding. By using a Likert-type survey with perspective design renderings used to collect and compare data from both skateboarders and non-skateboarders, as well as observing and recording evidence of street skateboarding and its damages, solutions best fit for the study's site area of The Eli and Edythe Broad Art Museum will be determined. Ultimately, this study's conclusions are intended to add to the knowledge of combating street skateboarding conflict. This study's findings show that only in specific instances there are significant differences of perceptions between skateboarders and non skateboarders when determining the effectiveness of planting based street skateboarding deterrents and that a street skateboarding conflict exists at the Eli and Edythe Broad Art Museum. Having just made its debut at the Tokyo 2020 Summer Olympic Games, it is inevitable new effective street skateboarding mitigation strategies will be needed as the sport continues to grow around the world.

This thesis work is dedicated to the street skateboarding community. To not shame the sport of street skateboarding but to open a discussion about the sports future and the spaces street skateboarders will skate.

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PREFACE

Skateboarding has been a passion of mine since my childhood. Skateboarding as well as an interest in skatepark design is what initially inspired me to pursue a degree in Landscape Architecture. In no way was this thesis intended to damage or negatively impact the perception of the sport of street skateboarding. A goal of this thesis is to open a discussion about existing conflicts between street skateboarding and urban public spaces and to explore solutions to improve the future of the sport and the communities in which the sport takes place. I look forward to continuing to be a part of the skateboarding community and also to continue to watch the sport grow.

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1.0 INTRODUCTION:

1.1 Context

Dark waxed ledges, bent crooked handrails, and streaked wheel-marked walls have all become common eyesores in public urban spaces frequented by street skateboarders. Sitting in plain sight, street skateboarding spots exist in all urban environments and have been abused by street skateboarders as they perform their skate tricks down stairs, handrails, and ledges often leaving behind damages ranging from paint scraped off benches to \$10,000 damages (University of Louisiana, 2016). In addition to damages to property, street skateboarders can trespass and can create conflict with authorities (Pappalardo & Connito, 2016). Skateboarders can even pose a threat to nearby pedestrians. In one instance in 2011, an elderly woman was killed by a skateboarder as he collided with her skateboarding while crossing an intersection (Hamm, 2011). For over a decade, metal knobs or clamps have been used as skate deterrents or anti skateboarding tools intended to discourage skateboarding on ledges and rails (Mersom, 2015). Commonly referred to as “Skate-Stoppers” these metal clamps can be an extra cost for cities and in some instances have backfired and encouraged skateboarding due to the new metal knobs attracting more attention to an area that previously would not have stood out to skateboarders (Mersom, 2015). Known as a hero to the skateboarding community but as a vandal to cities, the “Knob Buster” is an anonymous individual who's been liberating skate spots all over California (Jenkem Staff, 2020). By wearing a mask and protective glasses to hide their identity, the “Knob Buster” has used handheld power tools and sledge hammers to liberate skate spots by removing skate stoppers (Jenkem Staff, 2020). While traditional skateboarding deterrents are the quick and simplest fix, the use of plant material in deterring street skateboarding is overlooked. This thesis will be looking into the relationship street skateboarders have with urban public spaces and add

to the existing knowledge of street skateboarding mitigation strategies such as skate stoppers, security cameras, and no skateboarding signs. Instead of these traditional deterrent methods, this work introduces methods making use of strategic landscape plantings that may effectively deter street skateboarding in urban spaces.

Since skateboarding's rise in popularity in the 1980's, its jump into mainstream media in the 1990's and the sports heavy interest in the street style of skateboarding was largely due to the popularity of the skateboarding video game series "Tony Hawk's Pro Skater" (Sprung, 2019). Since the success of the iconic video game series, the sport's trajectory has only become more impressive. On June 21st 2004 the first annual "Go Skateboarding Day" brought skateboarders together all around the world (Foley, 2021). Almost two decades later, street skateboarding's best competed at the sport's biggest event yet at the Summer 2020 Tokyo Olympic Games. Here the sport was performed in front of the most eyes ever on the world stage as this was the most-watched Olympic Games ever on digital platforms, with more than 28 billion video views in total (IOC, 2021). This was a significant accomplishment and milestone for the sport of street skateboarding and undoubtedly will bring more new street skateboarders to the sport than ever before. While new skateboarders take to the streets to begin their own journey to becoming the next olympic gold medalist, urban public spaces will inevitably become more frequented by street skateboarders potentially creating more street skateboarding related conflicts and damages. As Chiu & Giamarino (2019) mentioned, urban public spaces like New York's Brooklyn Banks and the Los Angeles Courthouse are two iconic examples of street skate spots that have become sentimental and historic to the entire skateboarding community. These popular skate spots created a large community of skateboarders who would frequent these spots thus greatly exacerbating the amount of destruction and conflict caused by street skateboarders within these

spaces (Chiu & Giamarino, 2019). Instances like this have made clear the physical destruction and stakeholder conflict in popular street skateboarding spots can lead to the implementation of unconventional efforts aimed at addressing the challenges of skating in urban spaces. This research examines the relationship skateboarders have with public spaces, how cities responded to increasing conflict with skateboarders, and how to best combat damage to property, trespassing, and other consequences of street skateboarding.

1.2 Skateboarding Conflict Within Literature

A number of researchers have investigated the relationship between skateboarding and public space (Beal, 2017; Chiu & Giamarino, 2019; Dickinson, 202; Howell, 2005; Németh, 2006; Nolan, 2003; O'Connor, 2018; Woolley, 2001). One explored how skateboarding and skate spots have been compared to other popular sports and their respective sports stadiums or fields (O'Connor, 2017). Németh (2011) documented the history of Philadelphia's Love Park while it received significant media attention after four hundred people gathered to protest at Philadelphia's city hall to oppose the decision to prohibit skateboarding in the park; a decision that even played a role in the city's Mayoral election. The skateboarders of Philadelphia viewed Love Park as their home and as a skateboarding paradise while the city deemed them as criminals (Nemeth, 2011). In another case study, skateboarders successfully converted a functional city courthouse of Santa Monica into a legalized skate plaza by partnering with the company Nike (Chiu and Giamarino, 2019). With street skateboarding reaching its peak after its addition to the 2020 Tokyo Summer Olympics, reviewing the literature explaining the history, growth, and current state of the sport is essential to providing an understanding of the drivers and outcomes of street skateboarding within the sport's short but explosive existence. This research explores existing literature by reflecting on street skateboarding case studies and identifying the

conflicts between skateboarding and urban public spaces whose outcomes can be analyzed in ways that contribute to creating a healthier relationship between street skateboarders and urban spaces.

Literature on street skateboarding is limited when compared to other sports related research topics. While browsing journal articles using the search engine Google Scholar, and using the keyword “Street Skateboarding” 223 results exist from all time. Compare that to a more established and traditional sport, searching using the keyword “Soccer,” over 30,000 results are found. When expanding the search by using the keyword “Skateboarding” rather than “Street Skateboarding” the search results are only increased to 736. This lack of interest in research regarding street skateboarding could be explained by the sport's short history and untraditional nature when compared to other sports that are popular in urban environments. Similar to street skateboarding, basketball is known to be popular in more urban areas where outdoor field space is limited (Logan, 2018). Basketball, being an older and more traditional sport compared to skateboarding, has over 18,000 articles when searched on Google Scholar. In recent years there has been progress in research related to skateboarding and urban places (Beal, 2017; Chiu & Giamarino, 2019; Dickinson, 202; Howell, 2005; Németh, 2006; Nolan, 2003; O’Connor, 2018; Woolley, 2001). Despite these great strides within the skateboarding literature, deficiencies still exist within this topic of research. As mentioned by O’Connor (2018) little is known about the understanding of the emotional connection skateboarders have with place. In addition, more could be understood about the methods used to deter skateboarders and which of these methods have been most effective. This last gap in research is the focus of this current study.

1.3 The Overall Goal

The purpose of this research is to shed light on the conflict existing between street skateboarders and public spaces. In doing so, street skateboarding mitigation design solutions utilizing strategic landscape plantings will be used to measure perceptions from skateboarders and non-skateboarders to answer which planting design is most effective in deterring street skateboarding and to determine if there is a significant difference in perceptions amongst skateboarders and non-skateboarders. The data collected for this research will enhance awareness around what landscape features and amenities are commonly abused by skateboarders as well as offer insight to designers, city planners, and architects as they create urban spaces. This study offers a perspective to people both outside of and those within the sport of street skateboarding and provides the chance to see how skateboarders and non-skateboarders perceive urban environments.

Ultimately this study aims to inform urban designers and planners on the growing sport of street skateboarding and the conflicts that often come along with it. By examining instances where street skateboarding has been prohibited or has created significant conflict within a space, the outcomes of these space's efforts combating street skateboarding have been taken into consideration while developing the alternative mitigation strategies explored in this study. Sports always find a way to grow and evolve, street skateboarding is no different. It is more important now than ever to better understand the history, relationships, and conflict resolution within street skateboarding as it is inevitable that without developing more effective street skateboarding deterrents, street skateboarders will continue to cause more conflict harming urban spaces.

2.0 LITERATURE REVIEW:

2.1 Introduction

A literature review on street skateboarding reveals connections, challenges, and conflicts between street skateboarders and public spaces (Beal, 2017; Chiu & Giamarino, 2019; Dickinson, 202; Howell, 2005; Németh, 2006; Nolan, 2003; O'Connor, 2018; Woolley, 2001). The Olympics, X Games, video games, and professional skateboarding have all put a spotlight on street skate spots. Literature on skateboarding in urban spaces reveals the conflicts that have existed in various famous skate spots (Chiu & Giamarino, 2019; Howell, 2005; Németh, 2006). These high profile skate spots, such as the NYC Brooklyn Banks, or Philadelphia's Love Park are familiar beyond the skateboarding community due to exposure from skate videos, competitions, and other elements of mainstream media. These researchers provide a new lens when looking at the conflicts within street skateboarding that are not explicitly expressed within mainstream media or even within the skateboarding world itself (Chiu & Giamarino, 2019; Howell, 2005; Németh, 2006). The literature review reveals what is known and unknown within the field of street skateboarding and urban public space and most importantly shows how further studies could contribute to not only the understanding the relationship between skateboarding and public spaces but also an understanding of the overall perceptions skateboarders have of urban public spaces. The following is a review of the literature on the topic of street skateboarding in public space. This literature forms the foundation for addressing the question of how to best eliminate the conflict existing between street skateboarding and public space.

2.2 Street Skateboarders Use Urban Spaces

Compared to more traditional competitive sports athletes, skateboarders are a unique group consisting primarily of youth who make use of their urban surroundings for skateboarding. In 2006 over seventy percent of skateboarders were identified as being between the age of twelve

to seventeen years of age (Gaille, 2018). Wooley and Johns (2001) examined why street skateboarders in the United Kingdom use particular areas by observing and investigating three focus groups in three major cities. The three cities were selected based on their scale of urban landscape, high population, and the amount of known skateboarding activity. Research was conducted using a qualitative study of twenty-five participants as they participated in tape recorded interviews to get a sense of their feelings, attitudes, and opinions on skateboarding. Findings showed that skateboarders choose to skate in these particular areas because of the space's accessibility, sociability, compatibility, and the opportunities the spaces offer for riding and performing tricks. The authors also reported that the issue of skateboarders using public space could always be an issue as there will always be a group of skateboarders who seek to skate urban terrain no matter how many skateparks are in the area. Lastly, the authors state that further research could better our understanding of skateboarders in the urban environment as well as better understanding how they are perceived by others in the city.

O'Connor (2018) identified the significant places existing within the sport of street skateboarding. Specifically, this research found that significant places in the sport of skateboarding tend to be ordinary urban spaces. Through media coverage, history, and interaction within the sport, these ordinary spaces became recognizable to skateboarders across the world, even as they remained overlooked by the general population. Unique to the sport of street skateboarding, skateboard athletes will travel and go out of their way for the opportunity to skateboard on an iconic stair set or handrail in the skateboarding community but to non skateboarders is an ordinary piece of a city. This can be compared to how other sports fans will travel to their favorite sports arena or professional sports field. By classifying skateboarding as a "lifestyle sport," O'Connor points out that lifestyle sports take place in areas other than sports

fields, tracks, or courts. Comparing skateboarding to “extreme sports” such as rock climbing, BMX riding, and parkour, the author points out how like skateboarding, these sports can be pursued individually, without scheduled practices, and without teammates. Looking past the physical spaces skateboarders use, the author provides an understanding of the emotional connection that street skateboarders have in relation to particular skate spots by pointing out instances where skateboarders participate in secular pilgrimages visiting skate spots. The author compares these acts of skateboarding pilgrimages to more traditional pilgrimages consistent within various religious practices. The author also provides insight into a skateboarder's emotion, culture, and ethics by conducting qualitative interviews amongst those in the skateboarding community. The author concludes that skateboarding is not unlike other sports in the sense of the history surrounding placemaking but the types of spaces that become significant in skateboarding are different compared to those spaces associated with other sports.

2.3 Historical Skateboarding Conflict in Public Places

Looking into the rise in popularity of street skateboarding in the 1990's, Németh (2006) examined the conflict between skateboarding and public space in Philadelphia's Love Park. On October fifth 2003 a decision was set to ban skateboarding in Love Park which at the time existed as the 'mecca of street skateboarding' (Németh, 2006). Much literature has researched marginalized groups such as political protesters or the homeless and their exclusion within public spaces (Doherty, 2008; Kohn, 2013). Ongoing homelessness in European cities and the instance of Occupy Wall Street are two examples that showcase the controversy regarding the privatization of public space. Each of these studies have examined how groups such as these have been excluded from public spaces due to groups not using the space as it was intended (Doherty, 2008; Kohn, 2013; Németh 2006). Németh (2006) specifically looks at Love Park and its conflict over

the right to define public space. This incident has occurred not only in Love Park but also all around the world as skateboarders have faced strict bans, and in some cases have received citations for carrying a skateboard on city-owned land. In the 1980s Philadelphia's skateboarders discovered the Love Park plaza made for a prime skate spot and by 1990 the spot was recognized internationally in the skateboarding community as "the most famous natural skateboard park in the world" (Németh, 2006, Conflict and Exclusion). In early 2000, a city councilman proposed a bill banning skateboarding citing an estimated \$60,000 of damage to the park due to skateboarding. Németh ultimately concluded that while skateboarding in Love Park was viewed as being irrational, disorderly, and worthy-of removal, the right to space can be challenged, debated, and can create change in a public space.

Further looking into the story of Philadelphia's Love Park, Howell (2005) explores the spatial politics of Love Park and the redevelopments aimed to gentrify the city. For two decades after the opening of Love Park in 1965, the park existed as a popular lunch spot for the nearby office workers. In the 1980's the park became a home for much of the homeless population while at the same time the park plaza became frequented by teen skateboarders. Initially the skateboarders were treated no better than the homeless until the 1990's when skateboarders became highly praised by the city's elite members consisting of city planners and officials. This unconventional praise was primarily due to the fact that the skateboarding scene in Love Park gave the city of Philadelphia a new hip image that appeared favorable for potential future investments. As skateboarders continued to skate and gather in the park, the skateboarding community and perception began to affect the city's political agenda. In 2000, in order to put an end to skateboarding and skateboarding related damages in the plaza, Mayor Street promised a new world class skateboarding facility while at the same time banning skateboarding in the city

and hiring architects to renovate Love Park aiming to deter skateboarding in the park. The skateboarding ban was known to have been enforced with violent police tactics that are documented in popular skate videos where street skaters filmed themselves trespassing and violating the ban in order to skate the plaza. After a plaza redevelopment added new planters, a new drainage system, and grass patches to block a skateboarder's pathways, skateboarding in the plaza became obsolete. This plaza redevelopment and police enforcement effectively eliminated skateboarding in the plaza but not without sacrificing the overall design of the plaza which once renovations were completed, was said to be a less favorable plaza design than its original. The skateboarders' opinions in Philadelphia became so important to city politics that in 2003 mayor candidate Sam Katz skated across Love Park as he declared if he were elected the skateboarders would return to Love Park. With all these events resulting from the rise of street skateboarding in Philadelphia, Howell references a book titled Skateboarding, Space and the City (Spencer, 2001). The book states that skateboarding is an activity that is a “critical exterior to architecture” and that skateboarding ultimately challenges the planning of spaces (Spencer, 2001). Howell adds to this understanding by explaining how the skateboarders transformed Love Park into a newer and more marketable form of space for the city. With this understanding failing to gain traction amongst city leaders, the park is now open to new reclamation as the skateboarding community has explicitly been pushed away.

Additional case study research explores neoliberal urbanism and the role of specific unwelcome interest groups in certain public spaces, Chiu and Giamarino (2019) describes two cases where skateboarders had trouble using public space. The authors investigated the politics and discourses existing in urban street skateboarding and its connection to placemaking by looking at what happened to both the Brooklyn Banks in New York City and the West LA

courthouse in California as skateboarders caused conflict skating in both areas. By leveraging specific neoliberal ideologies skateboarders attempted to claim their right to these public spaces . Together, Chiu and Giamarino proved how resilient skateboarders can be when fighting for their right to occupy and use these spaces. Resulting from their resilience, the Los Angeles skaters were able to transform the courthouse into a legal skate plaza by partnering with the brand Nike to purchase the property. In the case of the Brooklyn Banks however, the fight to reopen the spot is still being discussed. While it is currently closed off and equipped with surveillance and security measures, there is still a potential reopening scheduled for 2023. Overall this article emphasizes the battle between skateboarders and public space as well as the potential outcomes that can occur from these types of scenarios.

2.4 Good vs. Bad Skateboarding and its Impact on Communities

Nolan (2003) looked into how skateboarding is allowed in some areas but not welcomed in others. In his study, Nolan examined skateboarding as a transgressive activity meaning it is not accepted in the area. The study looked into the way certain areas were built and a person's attachments to the space. More specifically, the author investigated how through implementation/adoption of skateboarding restrictions and common skateboarding deterrents, skateboarding was discouraged in public spaces. More unique to this study, an understanding of what kind of skateboarding is allowed and what kind is not, is defined in this study as “good” and “bad” skateboarding. “Good skateboarding” is when skateboarders choose to skate in designated skateboarding areas or use skateboarding as a form of transportation. “Bad skateboarding” is when skateboarders choose to skate on private property or where skateboarding is prohibited. Nolan concluded that while skateboarding is viewed as a transgressive activity in public spaces, what is transgressive to one group may not be

transgressive to another. The Author also noted that evidence shows that women skateboarders skating within designated skate areas have felt out of place or not welcome amongst the other skaters.

Due to skateboarding's increasing popularity, there is an increased interest in marketing for the health, youth, and community development surrounding skateboarding thus leading to changes in communities across the world. Beal et. al, (2016) examined the impact of skateboarding on the economy and culture of youth sports in the United States. Centered around various case study examples focused on communities existing in Northern California, this study aimed to explore and explain the changes in community development, well-being, and youth-health resulting from increased interest in skateboarding. Through qualitative observations and interviews amongst parents, organizers, and skateboarders, Beal et al. concluded that skateboarding has community support and overall skateboarding improves the public good. However, the authors acknowledged that more work within the skateboarding community must be done to continue to serve the public good.

As a result of increased interest in skateboarding, the sport can provide various benefits to a community in ways more traditional sports cannot. Gilchrist and Wheaton (2017) explain how areas of research have begun to investigate how "lifestyle sports" can contribute to communities by increasing social benefits such as health, developing youth and even crime reduction. Skateboarding has been identified as the largest growing sport in the USA with over 10.1 billion participants (NSGA, 2008). Policy makers and governments have expressed interest in this group of athletes while viewing skateboarding as a trend of the twenty-first century and also realizing the sport's massive potential customer base (Gilchrist & Wheaton, 2017). Despite this gain in government interest, research within lifestyle sports has not yet been prioritized.

Gilchrist and Wheaton (2017) explain how new research in lifestyle sports such as skateboarding sheds light on the particular ways of life these lifestyle sports athletes typically experience. They go on to describe how lifestyle sports that lack rules, regulations, and adult supervision tend to experience more community engagement, creativity, and healthy lifestyles.

While some communities have already embraced the sport of street skateboarding, in other cities the sport's value is still on trial as it is viewed as uncivil and problematic while taking away and breaking apart a city's intended function and design (Wooley & Johns, 2001; Bannister et al., 2006). Dickinson, et al., (2021) take on a dual position of street skateboarding as it is viewed as both a destructive but also a serious activity. By performing a study based on "aesthetic criminology", they argue that street skateboarding is an aesthetic practice but is one that challenges the functionality and aesthetic order of the city. Rafter (2014) defines aesthetic criminology as 'the study of ways in which all things visually interact with crime and criminal justice, inventing and shaping one another. Supporting evidence gathered from semi-structured interviews with skateboarders is used to back up the study's claims and also to provide insight into some of the key skateboarders in Manchester (Dickinson, et al., 2021). The research concludes that despite its recent debut at the Olympic Games, tension between street skateboarding and cultural acceptance will continue to exist. One solution brought forward by a Manchester skateboarder was that rather than spending money on excluding skateboarders, the local authority could use that same money to include and integrate them into the city. It was ultimately concluded that in order to gain inclusion within their city, the skateboarders of Manchester must make clear that skateboarding can bring value and enhance the city in some way.

2.5 Alternative Conflict Resolution Strategies for Street Skateboarding

Skateboarding exists as a sport that is often excluded from public spaces (Nolan, 2003). Much like other interest groups within the urban spaces such as graffiti artists or parkour athletes, a skateboarder's right to space can come into conflict with what the city deems as acceptable use of space. Rather than banning skateboarding entirely, or purchasing and installing skate stoppers or hiring security guards, an inclusion based effort can allow skateboarders to coexist in a city like any other marginalized group normally would. By proposing a series of urban space designs that allow for the inclusion of skateboarding within the elements of a city, Ross (2021) provides opportunities for cities to engage with skateboarders rather than shut them out of the design and planning process. Designing both at the detail and urban scale through the use of adaptive and modular designs, The author reimagines Vancouver British Columbia into a functional and skateable urban space. The author concludes that if our goal is to create a truly “open and accessible public space for all” it is critical that we ensure our definition of ‘public’ is inclusive and representative of the diversity of people and uses our city encompasses and that designers and city planners must reexamine what should and should not be done in shared public spaces.

In addition to Ross’ efforts of inclusion based design, researchers Glenney and O’Connor (2019) propose a reimagining of skateparks and skateboarding by introducing hybridity or making skateparks hybrid elements of the city. Touching on how skateboarders have repurposed common architecture such as swimming pools, the researchers point out how skateboarding has also influenced design outside of skateparks. By designing prohibitive features or hostile architecture, architects have been able to combat destructive street skateboarding. Today a hybrid form of the skatepark has become the new standard and the most popular style of skatepark

called a ‘skate plaza’ full of common urban elements such as stairs, handrails and ledges. Other nontraditional forms of skateparks have made waves in skatepark design such as ‘stealthparks’ (Glenney & O’Connor, 2019). These types of skateparks are designed to appeal to skateboarders while not necessarily being declared as a skatepark. Another form of skatepark called ‘Pump Tracks’ has become a popular alternative to the traditional skateparks (Skateboard Pump Track, 2021). Generally these tracks have a narrow winding riding surface with many turns and ramps allowing for a fast carving riding style and experience. Glenney and O’Connor (2019) conclude that a skatepark cannot be understood just as a designed and constructed element. By examining how skatepark design has changed over the years it is clear that the longevity of skateparks is far from over.

2.6 User Perceptions on Plant Material Selections

Much is known about plant selections and public perception mostly regarding street planting’s and their attractiveness, shade, and visibility (Fernandez et al., 2019; Mullaney et al., 2015). One study based in the streets of the city of Shah Alam, a group of researchers conducted a study on street plantings to compare preferences of street planting compositions between the public and landscape architecture experts (Othman et al., 2015). This study categorized street plantings into four categories of roundabouts, islands, roadside, and road divider plantings. In addition to the type of street planting, tree shapes and canopies were also evaluated and included round, oval, weeping, umbrella, upright funnel, conical, and irregular tree shapes. After surveying 296 respondents made up of both the public and landscape experts, the researchers were able to conclude which street planting characteristics are perceived to have a higher visual quality. The comparison of experts and public perceptions provided an understanding of how preferences for street plantings may differ. Ultimately this study provided useful information to

landscape architects and planners on how to make a planting design that is appreciated by all users.

Literature on plant selection and user preference also includes a study assessing user perceptions of planting designs on rural greenways (Rovelli et al., 2020). Rovelli et al. presented four digitally rendered video scenarios which simulated biking along a greenway at a speed of 25 km/h to determine which kind of planting is most preferred and which planting type is perceived as being the most restorative. In this study, participants were given a questionnaire including a perceived restorativeness scale. A total of 297 participants were presented with sixty second video renderings of four different planting layouts typical to the rural greenways in the north Italy plain. These four renderings consisted of various bike lane or greenway layouts made up of different types of plant material ranging from trees, shrubs, and limited planting material. The researchers concluded that participants' preferences were affected by the perception of scenarios' restorative value and that restorativeness is not a matter of quantity of vegetation but is a matter of its quality and planning variety.

2.7 Visual Preference Surveys and Likert Scales

Visual preference surveys have been used in the planning and design processes to capture preferences for various designs for the built environment (University of Delaware, n.d.). Regarding the field of Landscape Architecture existing as the physical space and how people perceive and use space, a visual preference survey could be an effective method of data collection as it consists of realistic imagery of the built environment. Ewing (2001) applied visual preference methods to determine user preferences regarding elements included in transit stops. Most helpful from Ewing's study was the background of visual preference surveys (VPS) that he provided. He pointed out that most VPS usually have fifty to one hundred participants

with smaller groups being used for more specialized surveys. These smaller groups consisting of as small as fifteen participants are still reliable enough for most survey applications. Participants in these VPS are typically shown hand drawn or computer rendered photographs where their reactions from viewing are recorded for analysis. Most commonly, the participants' responses are recorded on a 1 to 5 or 1 to 10 scale of least to most preferable. By following these VPS guidelines, the researcher was able to successfully conclude which factors such as, shelter, trees, or a sidewalk, were most preferable in having while waiting at a bus stop.

Adding to Ewing's knowledge of visual preference surveys, a group of researchers from The Netherlands quantify the pedestrian perception of walkability using a visual preference survey consisting of 3D street designs (Kasraian et al., 2021). By randomly surveying six hundred people in Toronto, this study discovered that there is a high preference for streets that include transit lanes rather than lanes that are exclusive to only vehicles. This study overall contributed to investigating the importance of pedestrian perception of streets. Most importantly, the researcher claims that this survey setup and methodology can be repeated in similar studies. The current research adopts Kasraian et al.'s research method and uses the VPS as a major survey tool to determine what landscape planting methods could be effective in deterring unwanted street skateboarding. While Kasraian et al.'s study focused on context specific features of the street such as car lanes, sidewalks, and walkability, in the context specific features will be various types of planting materials. While Kasrainan et al.'s study focused on walkability, the current study will assess "Skate-ability".

2.8 Conclusion

With street skateboarding being such a new and unique sport, it is clear more must be done to fully understand the ins and outs of skateboarding and the relationships skateboarders

have with cities and urban spaces. In addition to what is known about street skateboarding, research on the methods used to deter skateboarders from urban areas could add to the understanding needed to more effectively eliminate conflict between skateboarders and urban spaces. The existing skateboarding knowledge and literature included in this literature review have provided a foundation for this study's research in testing strategic landscape plantings effectiveness in deterring street skateboarding.

3.0 METHODS:

3.1 Introduction

This study uses VPS to assess the perceived effectiveness from street skateboarders and non-skaters of different planting designs used to deter street skateboarding. After developing a set of six strategic landscape planting methods, it was presented to survey participants in the form of a VPS to determine which strategic planting solution is perceived as the most effective. The six strategic landscape planting solutions were developed into realistic three-dimensional renderings using the computer software 'RealTime Landscaping Pro.' Each rendering included a common street style planting bed enclosed by a common granite style ledge consistent across all design solutions the only difference being the plant material/planting strategy used. Data collected from this survey will be analyzed to statistically determine which strategic landscape planting solution is perceived as most effective in deterring street skateboarding amongst both skaters and non skaters. Since this research is based at Michigan State University, the landscape planting solutions found most effective will be included in a final design output that redevelops the Michigan State Eli & Edythe Broad Art Museum, a vulnerable street skateboarding spot on Michigan State's main campus.

3.2 Site Location and Description

Michigan State University's main campus stretches over 5,000 acres and is home to nearly 50,000 students (Michigan State University, 2021). Less than a half mile away from Michigan State's Campus is Lansing's "Ranney Skatepark." Based on site visits and observations, together the area's local skateboarders and Michigan State University skateboarders make up the majority of the area's skateboarding population. Amongst the many

skate spots scattered across Michigan State University's campus, The Michigan State Eli & Edythe Broad Art Museum is known to be a skateboarding hotspot on campus (S. Kribs, personal communication, October 12th 2021). The museum was first opened in 2012 designed by world renowned Architect Zaha Hadid (Mulcrone, 2012). Based on personal site observations while conducting this study, the museum's contrasting architecture and metallic surfaces attract street skateboarders from all over campus as the museum's unique and angular features offer much opportunity for sliding, grinding, and performing skate tricks upon. Located on East Lansing's Grand River Avenue, the high traffic and high profile location has potential to attract skateboarders from the entire Lansing area. To counter the frequent street skateboarding in the museum plaza, existing skateboard deterrents such as skate stoppers and no skateboarding signs have been installed throughout the museum's surrounding plaza. Further description and analysis of these existing skateboarding deterrents as well as documentation of various site visits and an interview with museum faculty is provided later on in the discussion section.

3.3 Hypotheses

Hypothesis 1

Null hypothesis: There is no significant difference between street skateboarder's and non skateboarder's perceptions of the effectiveness of plant material in deterring street skateboarding.

Alternative hypothesis: There is a significant difference between street skateboarder's perceptions and non skateboarder's perceptions of the effectiveness of plant material in deterring street skateboarding.

Hypothesis 2

Null hypothesis: There is no significant difference between longboarder's and non skateboarder's perceptions when determining whether plant material is effective in deterring street skateboarding.

Alternative hypothesis: There is a significant difference between longboarder's and non skateboarder's perceptions when determining whether plant material is effective in deterring street skateboarding.

Hypothesis 3

Null hypothesis: There is no significant difference between both street skateboarder's and longboarder's perceptions compared to non skateboarders when determining whether plant material is effective in deterring street skateboarding.

Alternative hypothesis: There is a significant difference between both street skateboarder's and longboarder's perceptions compared to non skateboarders when determining whether plant material is effective in deterring street skateboarding.

3.4 Survey

The visual preference survey consists of the following six different strategic landscape planting solutions: 1) Hostile landscape plantings, 2) pollinator attracting plantings, 3) unpleasant smelling plantings, 4) hanging/spreading plantings, 5) planting debris obstruction, and 6) strategic lawn patches. In this study, the hostile landscape planting consisted of planting material consisting of thorns and spikes, (Figure 1). Pollinator attracting plantings are represented in this study as plantings consisting of flowering plants that would attract pests such

as bees (Figure 2). The unpleasant smelling planting strategy in this study is represented as a planting consisting of plants that appear to produce an unpleasant smell (Figure 3). The hanging and spreading planting strategy in this study's survey is represented by a planting consisting of low spreading or hanging plants such as groundcovers or vines that obstruct or cover the ledge surface (Figure 4). The planting debris obstruction design in this study's survey is represented as a landscape planting that consists of plants that appear to have dropped excess amounts of fruit, leaves, seeds, or other plant debris that would typically collect underneath a street planting (Figure 5). Lastly, lawn patches planting strategy in this study is represented as various patches of lawn placed strategically around the planting bed ledges (Figure 6). These six strategic landscape planting solutions used in this study's VPS can be viewed in the figures below.

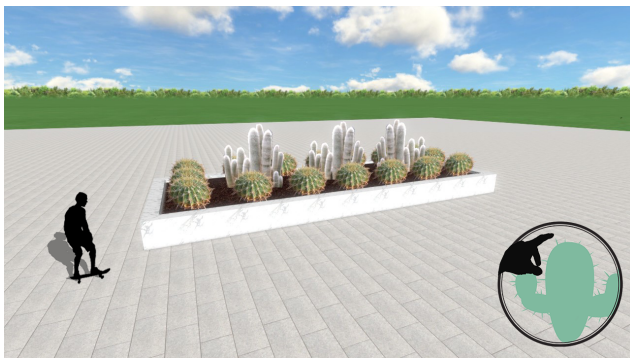


Figure 1: Hostile Landscape Planting



Figure 2: Pollinator Attracting Planting



Figure 3: Unpleasant Smelling Planting



Figure 4: Overhanging/ Spreading Planting

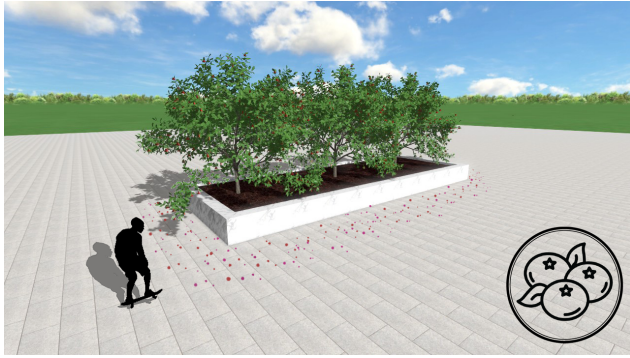


Figure 5: Planting Debris Obstruction

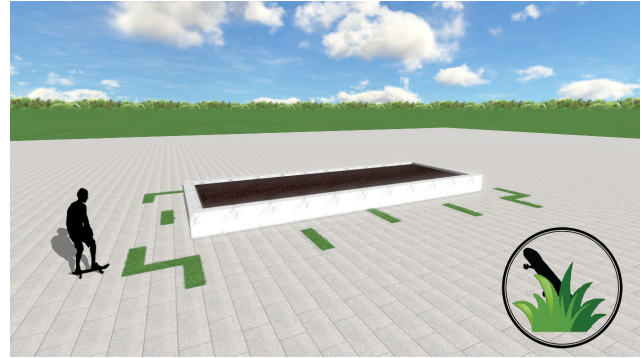


Figure 6: Strategic Lawn Patches

To eliminate any confounding variables, a consistent marble planter ledge measuring 34' long and 12' wide at 1'6" tall was used across all design renderings. The same angle, distance, and sun orientation/time of day was consistent across all renderings as well. To reduce confusion while taking the survey, a graphic symbol to represent each planting strategy was included on each rendering as well as description of the intended function of the planting solution. Additionally, a consistent silhouette of a street skateboarder was included using photoshop to show the intention of the ledge being skateboarded upon.

The survey was made using Google Surveys and is made up of two sections. The first section consisted of six contextual and demographic questions regarding the participant and street skateboarding on Michigan State's Campus. The second part of the survey consisted of six visual preference questions using a 1-10 Likert style response scale asking the participant to rate their likeness whether they would skate on the ledge given each planting strategies implementation. The 1-10 Likert item responses range from one, meaning "not very likely" to skateboard on the ledge and 10 meaning "Very Likely" to skateboard on the ledge. After receiving approval from the Institutional Review Board, survey participants were gathered from November 2021 to February 2022 by distributing a flyer across campus with an attached QR

code linking the participant to the online survey (Figure 7). Additionally, survey participants were gathered by approaching skateboarders across campus and asking them to take the survey. Survey respondents were offered the chance to win a \$25 Amazon store gift card for their participation. Responses from 40 participants were gathered while conducting this study.

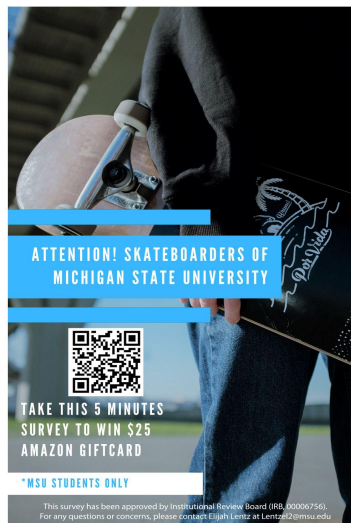


Figure 7: Survey Flyer

3.5 Data Analysis Plan

To test all 3 hypotheses within this study, initial survey data was coded into SPSS into Likert item data. This data analysis method varies from Likert scale data as each question exists as an individual Likert item and is measured separately while categorizing the survey data as ordinal rather than scale data. All six planting designs had its respective 1-10 response survey data coded into SPSS into likert item data as follows. Response values of 1-2 coded as 0 in SPSS meaning (not very likely) 3-4 coded as 1 (not likely), 5-6 coded as 2 (neutral), 7-8 codes as 2 (likely), and lastly survey response values of 9-10 coded in SPSS as 4 meaning (very likely). Survey responses were grouped into SPSS according to each participant's response to, *What type of Skateboarder do you most identify as?* This created three groups of skateboarders to have their

responses tested against the group of non skateboarders. They are street skateboarders vs. non skateboarders, longboarders vs. non skateboarders, and both skateboarders and longboarders vs non skateboarders. The street skateboarder group consisted of 15 street skateboarders vs 10 non skateboarders. The longboarder group consisted of 15 longboarders vs 10 non skateboarders. Lastly the street skateboarder group combined with the longboarder group consisted of 30 skateboarders and longboarders vs 10 non skateboarders. Each group's Likert item analysis consisted of a Model Fit test, Goodness of Fit test and a Chi squared test.

In order to make more statistical analysis available, using SPSS the existing Likert item data was combined to create a new variable of Likert scale data with likeliness to skateboard/ perception being the dependent variable and the survey respondent's self identity regarding skateboarding as the independent variable. This One-Way Anova test tells whether the experimental manipulation was generally successful. It does not provide specific information about which groups were affected. After the One-Way ANOVA test was completed in SPSS, Levene's test was used to test whether the variances of the three groups are significant. If the value of Significance. is less than .05 then the variances are significantly different.

4.0 FINDINGS:

4.1 Descriptive Statistics

The survey participation consisted of a total of 40 participants. Each question's responses have been organized into the tables below showing the type of strategic landscaping solution being tested and the quantity of each response ranging from value 1-10.

Table 1: How likely is a skateboarder able to "street skateboard" on this ledge with plant debris on the ground? (attempt to grind/slide, or skate upon this ledge)

Response	1 Not Very Likely	2	3	4	5	6	7	8	9	10 Very Likely
# of responses	11 27.5%	5 12.5%	7 17.5%	3 7.5%	2 5%	0 0%	2 5%	3 7.5%	1 2.5%	6 15%

Mean: 4.275

Mode: 1

Standard Deviation: 3.286

Table 2: How likely is a skateboarder able to "street skateboard" on this ledge with sharp/hostile plants around? (attempt to grind/slide, or skate upon this ledge)

Response	1 Not Very Likely	2	3	4	5	6	7	8	9	10 Very Likely
# of responses	15 37.5%	3 7.5%	5 12.5%	1 2.5%	4 7.5%	2 5%	1 2.5%	0 0%	2 7.5%	7 17.5%

Mean 4.175

Mode: 1

Standard Deviation 3.485

Table 3: How likely is a skateboarder able to "street skateboard" on this ledge with unpleasant scented plants? (attempt to grind/slide, or skate upon this ledge)

Response	1 Not Very Likely	2	3	4	5	6	7	8	9	10 Very Likely
# of responses	15 37.5%	1 2.5%	8 20%	3 7.5%	3 7.5%	1 2.5%	1 2.5%	1 2.5%	1 2.5%	6 15%

Mean: 3.857

Mode: 1

Standard Deviation: 3.124

Table 4: How likely is a skateboarder able to “street skateboard” on this ledge with overhanging plants? (attempt to grind/slide, or skate upon this ledge)

Response	1 Not Very Likely	2	3	4	5	6	7	8	9	10 Very Likely
# of responses	20 50%	5 5%	5 5%	3 7.5%	1 2.5%	0 0%	1 2.5%	1 2.5%	1 2.5%	3 7.5%

Mean: 2.9

Mode: 1

Standard Deviation: 2.845

Table 5: How likely is a skateboarder able to “street skateboard” on this ledge with plants that attract bees? (attempt to grind/slide, or skate upon this ledge)

Response	1 Not Very Likely	2	3	4	5	6	7	8	9	10 Very Likely
# of responses	14 35%	2 5%	4 10%	4 10%	2 5%	4 10%	1 2.5%	1 2.5%	1 2.5%	7 17.5%

Mean: 4.35

Mode: 1

Standard Deviation: 3.409

Table 6: How likely is a skateboarder able to “street skateboard” on this ledge with strategically placed lawn patches? (attempt to grind/slide, or skate upon this ledge)

Response	1 Not Very Likely	2	3	4	5	6	7	8	9	10 Very Likely
# of responses	13 32.5%	9 22.5%	4 10%	1 2.5%	1 2.5%	4 10%	2 5%	2 5%	1 2.5%	3 7.5%

Mean: 3.625

Mode: 1

Standard Deviation: 3.002

Across all six landscape planting strategies the mean response score was the lowest in the landscape strategy using hanging/spreading plant material (mean = 2.9). This means that across all 40 survey participants, the hanging/spreading planting strategy was perceived as being the most effective in deterring street skateboarding. The remaining five planting strategies perceived effectiveness in deterring street skateboarding ranks from most to least effective as follows.

Strategically placed lawn patches with a mean response value of 3.6; unpleasant scented plants with a mean response value of 3.857; hostile plantings with a mean response value of 4.2; plant

debris material with a mean response value of 4.2; and pollinator attracting plantings perceived as being least effective with a mean response value of 4.3. The mode response across all six landscape planting strategies was by far 1 “*Not Very Likely*”.

4.2 Ordinal Regression Likert Item Analysis

To test all 3 hypotheses within this study, initial survey data was coded into SPSS into Likert item data. This data analysis method varies from Likert scale data as each question exists as an individual Likert item and is measured separately while categorizing the survey data as ordinal rather than scale data. All six planting designs had its respective 1-10 response survey data coded into SPSS into likert item data as follows. Response values of 1-2 coded as 0 in SPSS meaning (not very likely) 3-4 coded as 1 (not likely), 5-6 coded as 2 (neutral), 7-8 codes as 2 (likely), and lastly survey response values of 9-10 coded in SPSS as 4 meaning (very likely). Survey responses were grouped into SPSS according to each participant's response to, *What type of Skateboarder do you most identify as?* This created three groups of skateboarders to have their responses tested against the group of non skateboarders. They are street skateboarders vs. non skateboarders, longboarders vs. non skateboarders, and both skateboarders and longboarders vs non skateboarders. The street skateboarder group consisted of 15 street skateboarders vs 10 non skateboarders. The longboarder group consisted of 15 longboarders vs 10 non skateboarders. Lastly the street skateboarder group combined with the longboarder group consisted of 30 skateboarders and longboarders vs 10 non skateboarders. Each group's Likert item analysis consisted of a Model Fit test, Goodness of Fit test and a Chi squared test. The results for each are included in the space below.

Table 7: Street Skateboarders vs Non Skateboarders Perceptions on Planting Design Strategies (Likert Item Analysis)

Planting Design	<i>Overhanging/ Spreading Planting</i>	<i>Planting Debris Obstruction</i>	<i>Hostile Landscape Planting</i>	<i>Unpleasant Smelling Planting</i>	<i>Pollinator Attracting Planting</i>	<i>Strategic Lawn Patches</i>
Model Fit Sig.	.284	.417	.007	.015	.289	.734
Goodness of Fit Sig. (Pearson)	.591	.447	.551	.708	.018	.584
Chi Square	.499	.523	.066	.168	.038	.716

Table 8: Longboarders vs Non Skateboarders Perceptions on Planting Design Strategies (Likert Item Analysis)

Planting Design	<i>Overhanging/ Spreading Planting</i>	<i>Planting Debris Obstruction</i>	<i>Hostile Landscape Planting</i>	<i>Figure 3: Unpleasant Smelling Planting</i>	<i>Pollinator Attracting Planting</i>	<i>Strategic Lawn Patches</i>
Model Fit Sig.	.765	.346	.765	.795	.649	.707
Goodness of Fit Sig. (Pearson)	.120	.696	.322	.140	.033	.811
Chi Square	.167	.689	.488	.124	.063	.923

Table 9: Both Street Skateboarders and Longboarders vs Non Skateboarders Perceptions on Planting Design Strategies (Likert Item Analysis)

Planting Design	<i>Overhanging/ Spreading Planting</i>	<i>Planting Debris Obstruction</i>	<i>Hostile Landscape Planting</i>	<i>Unpleasant Smelling Planting</i>	<i>Pollinator Attracting Planting</i>	<i>Strategic Lawn Patches</i>
Model Fit Sig.	.540	.861	.095	.215	.286	.640
Goodness of Fit Sig. (Pearson)	.820	.368	.973	.476	.178	.868
Chi Square	.891	.520	.581	.475	.235	.911

4.3 Likert Scale One-Way ANOVA

In order to make more statistical analysis available, using SPSS the existing Likert item data was combined to create a new variable of Likert scale data with likeliness to skateboard/ perception being the dependent variable and the survey respondent's self identity regarding skateboarding as the independent variable. This One-Way Anova test tells whether the experimental manipulation was generally successful. It does not provide specific information about which groups were affected. After the One-Way ANOVA test was completed in SPSS, Levene's test was used to test whether the variances of the three groups are significant. If the value of Significance. is less than .05 then the variances are significantly different. The results can be viewed in the table below.

Table 10: Likert Scale ANOVA Result

	Sum of squares	df	Mean Square	F	Sig.
Between Groups	136.567	2	68.283	1.40	.257
Within Groups	1792.533	37	48.447		
Total	1929.100	39			

Because the significance is greater than .05, the Null Hypothesis is accepted meaning the perceptions of likeliness to skateboard is not significantly different among skateboarders, longboarders, and non skateboarders.

5.0 DISCUSSION:

5.1 Interpreted Results

To answer this study's hypotheses, first looking at the Model Fit test, if the significant value is less than 0.05 the Null Hypothesis is rejected and the Alternative Hypothesis is accepted. This would mean there is a significant difference between the baseline model and the final model. If the significant value for model fit is greater than 0.05 then the Null Hypothesis is accepted. Across all 3 skateboarding groups/hypotheses being tested, the Model Fit test was shown to be significant in two scenarios both in the street skateboarders vs non skateboarders category. In this category, perceptions between street skateboarders and non skateboarders showed to be significantly different in both the hostile planting design with a significance value of .007 and the pollinator attracting planting design with a significance value of .015. Testing the first hypothesis, (perceptions of street skateboarders vs non skateboarders), in the four other planting strategies, the null hypothesis is accepted while the hostile planting and the pollinator attracting planting the alternative hypothesis is accepted. Testing the second and third hypotheses regarding perceptions of longboarders vs non skateboarders and both street skateboarders and longboarders combined vs. non skateboarders, respectively, the Null Hypothesis is accepted in all instances. Despite each group's test for significance, comparing the mean response values amongst street skateboarders, longboarders, and non-skateboarders shows how each group responded on average. Each group's mean response value ranks from highest to lowest meaning most likely to least likely to skateboard as follows. Street skateboarders 1.623; longboarders 1; non skateboarders .967.

The Goodness of Fit tests whether the observed model is consistent with the fitted model. If the significance value is greater than 0.05 then the Null Hypothesis is accepted. In the Goodness of Fit test, the Null Hypothesis is accepted in all but two instances. In the category longboarders vs. non skateboarders and the category street skateboarders vs. non skateboarders, the Null Hypothesis is rejected and the Alternative Hypothesis is accepted only in the instance of testing the pollinator attracting planting design strategy. In the longboarder vs non skateboarder category, the Goodness of Fit significance value for pollinator attracting planting is .033 and .018 in the street skateboarder vs non skateboarders category. Lastly the Chi-Square tests for significance between two nominal groups. This data's Chi-Square test accepts the null hypothesis in all but one instance. The Null Hypothesis is rejected and the alternative is accepted in the category street skateboarders vs non skateboarders in the instance testing pollinator attracting planting which has a Chi-Square significance of .038.

While the Likert Scale One-Way ANOVA tells whether the experimental manipulation was generally successful, a significance level of .257 may be a sign of at least some level of significance. Although this significance value does not pass Levene's test (i.e. the value of significance is less than .05) and the Null Hypothesis was accepted, perhaps if each respondent group of street skateboarders, longboarders, and non-skateboarders were all equal and had a larger quantity, then a more significant association could have been found. Ultimately this study's results might justify the need for additional similar studies to determine a definitive association between likeliness to skateboard and between various groups of skateboarders or non skateboarders.

5.2 Post Study Thoughts

Although the raw data based on mean response value shows the hanging/spreading planting design strategy to be most effective across all respondents in deterring street skateboarding compared to the other five planting strategies, there is more to interpret when comparing Likert item results across different groups of survey participants. Before interpreting the Likert item analysis however, the descriptive statistics must not be overlooked. Included in the descriptive statistics, a mode response value of 1 across all six landscape planting strategies, concludes that most participants overall perceived each landscape planting strategy to be effective in deterring street skateboarding. Additionally, the differences in mean response value across each question can be interpreted as the lowest mean response value being the most effective landscape planting strategy across all participants. A mean value difference of 1.45 from most to least effective may not seem very significant but on a 1-10 scale a 1.45 value difference can arguably be significant. If a response scale of 1-5 was used rather than the 1-10 scale, then we could have expected an even smaller difference in mean response value across all measured landscape planting methods.

Further conclusions can be made when interpreting this study's data in means of a Likert item analysis. A Likert item analysis was conducted rather than a Likert Scale analysis due to the data this study collected. Having three categories of survey respondents existing of street skateboarders, longboarders, and both street skateboarders and longboarders, an additional independent variable would have been required to perform a Likert Scale analysis. The Likert item analysis allows for a statistical analysis between each survey question existing as a Likert item respective to each category of survey participation. Looking at this study's results as a whole, the Null Hypotheses are accepted due to there being no overwhelming or even a majority

of significant results across all three statistical analyst tests including Model Fit, Goodness of Fit, and Chi-Square. While the first hypothesis testing perceptions between street skateboarders and non skateboarders had the most instances of significant findings, they were not overwhelming across all planting design strategies. It could be explained that the reason that the street skateboarding vs non skateboarding category showed to have significance when testing the hostile landscaping, unpleasant smelling, and pollinator attracting planting strategies is due to the strategies appearing to be less practical or effective compared to the planting design strategies that appear to be more effective to the common person. For example, it is likely that the overhanging/spreading planting design would appear to anyone as being more effective in deterring skateboarding due to the ledge appearing to be almost completely obstructed by plant material compared to the pollinator attracting planting that has the full ledge exposed.

When comparing skateboarders to non skateboarders, I expected the skateboarders to perceive effectiveness differently from the non skateboarders due to the skateboarder's likely individual experiences within the sport. What was most surprising was that hostile landscape planting strategy was overall measured as being the third most effective landscape planting strategy for deterring street skateboarding. This was surprising due to the existing knowledge and ongoing use and effectiveness of hostile landscaping strategies used to deter other transgressive activities in public spaces such as trespassing or homelessness. In this study's results, I believe overhanging and spreading landscape planting strategies was measured as the most effective strategy overall due to the level of obstruction the hanging and spreading plant is perceived as being in the digital rendering. In one instance however existing outside of the Eli & Edythe Broad Art Museum, this overhanging/spreading planting design strategy has been implemented making use of Japanese Forest Grass positioned above the ledge outside the Eli & Edythe Broad

Art Museum's West Plaza. However it is clear that this planting's effectiveness does not match what has been concluded from his study's results. It appears that some grasses have been forcefully removed to allow for street skateboarding to be performed on the ledge. This instance can be viewed below in figure 8.



Figure 8: Damage and Waxed Ledge Outside The Eli and Edythe Broad Art Museum

On paper, the function and effectiveness of this strategy being used to deter street skateboarding seems simple and effective. However, it is clear more planning and consideration must be done in regards to the type of hanging and spreading plant material that is used to have a better chance at being an effective solution. For example, a Creeping Juniper, such as 'Juniperus Horizontalis' is a low growing and spreading plant that could be positioned on top of the ledge to hangover the top and sides of the ledge. The plant species' long and strong branchlike spreading habit could be more durable and more difficult to remove compared to the existing Japanese Forest Grass. The take away from the landscape planting strategies explored in this study ultimately are limited as they only capture user perceptions and show the overall function and intent of each strategy lacking real world installation and testing. It should be understood that

based on climate, piece of architecture being protected, and other factors significant to individual instances of street skateboarding in urban settings, that it is critical that each landscape planting strategy be developed at each individual instance of targeted street skateboarding deterrence.

5.3 Application of Research

While engaging in site visits to the Michigan State University Eli & Edythe Broad Art Museum, observations and recordings of instances of street skateboarding related damages confirmed the assumptions and claims about skateboarding at the museum. Existing as one of MSU's popular street skateboarding spots, The Eli & Edythe Broad Art Museum due to its unique style and design features a plethora of desirable street skateboarding elements as well as a variety of traditional street skateboarding deterrents such as surveillance cameras, metal skate stoppers, no skateboarding signs, and even security guards. Despite the Museum's efforts to eliminate skateboarding within the museum's plaza, the museum is still regularly visited by street skateboarders. This concentration of street skateboarding has contributed to further damages in the museum plaza as well as further implementation of skateboarding deterrents. The plaza's damages, existing deterrents, and additional site information can be viewed in the photos below.



Figure 9: Plaza Security Cameras



Figure 10: Plaza Signage



Figure 11: Metal Skate Stoppers behind Museum



Figure 12: Skateboard Wheel Marks on Ledge



Figure 13: Paint/Grind Marks on Bench

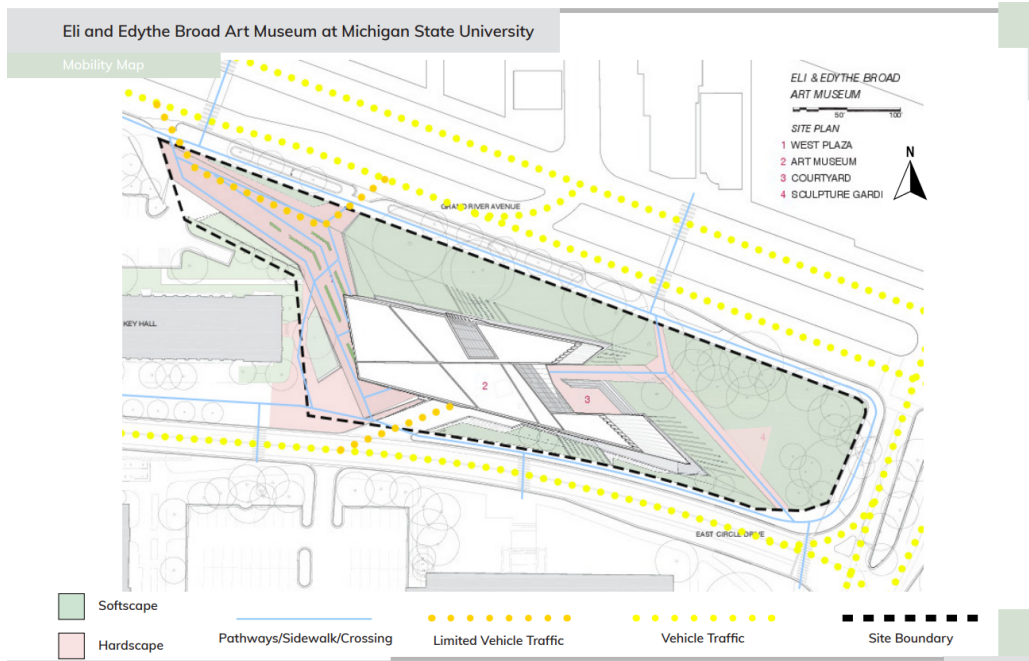


Figure 14: Circulation Map

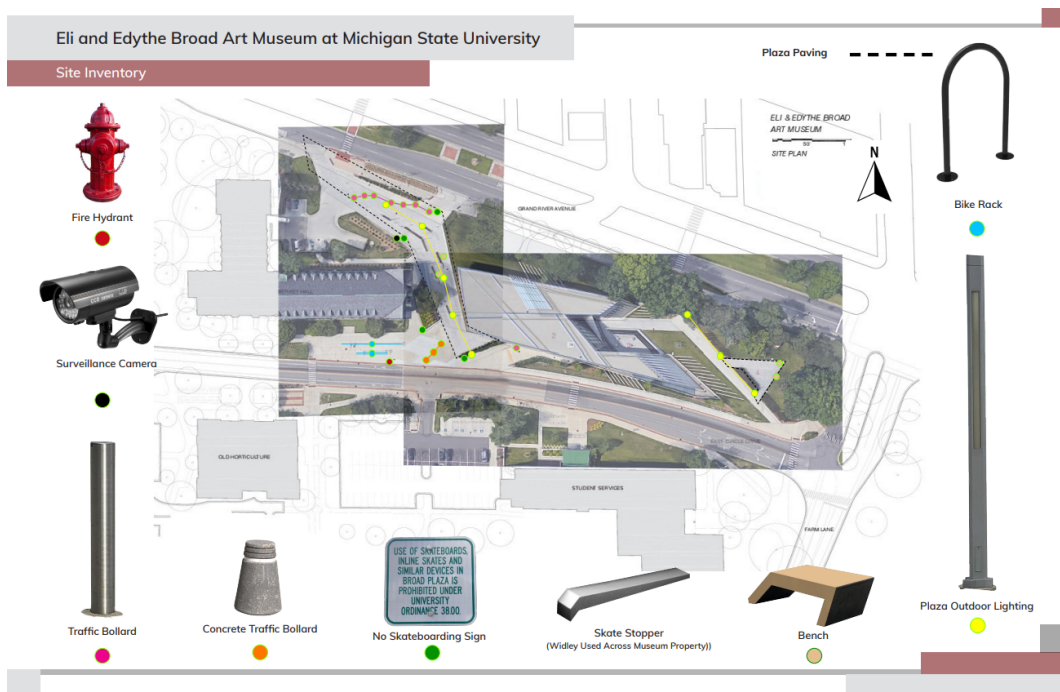


Figure 15: Site Inventory

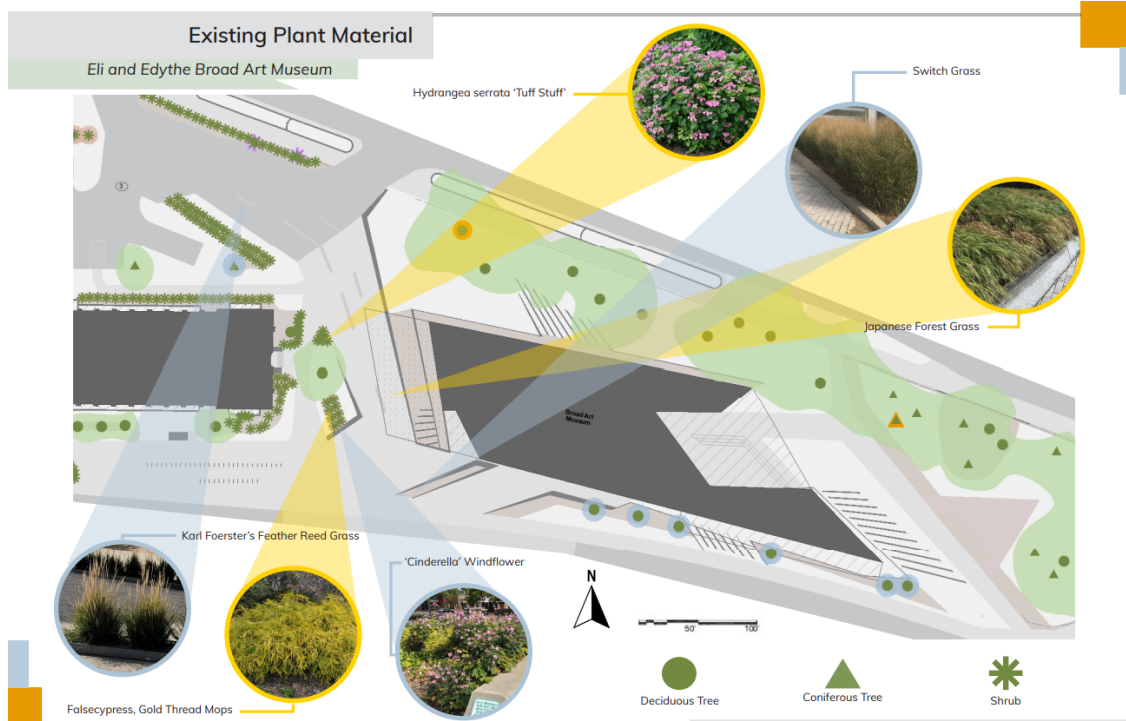


Figure 16: Plaza's Existing Plant Material

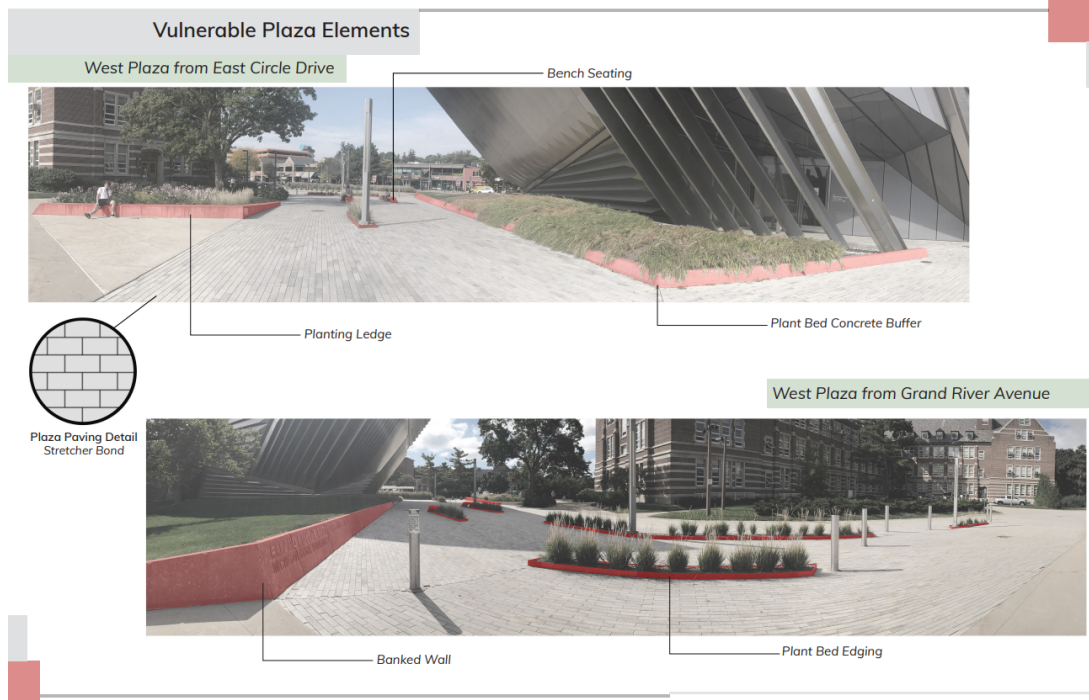


Figure 17: Plaza Elements Vulnerable to Street Skateboarding

This collection of observations as well as this section's informal interview were conducted across various site visits in Fall 2021. To have a more complete understanding of the street skateboarding conflict at the Broad Art Museum, a discussion with the museum's facilities and operations manager Stephanie Kribs was conducted. This discussion allowed for a chance to ask questions and share with Stephanie the research topic in the context of the Broad art Museum. The discussion revealed that Stephanie was very familiar with the museum's conflict with skateboarders and that skateboarders even try to skate at the museum on a daily basis when the weather is nice. When asked what kinds of damages to property the skateboarders are responsible for, Stephanie recalled multiple repairs that have taken place across the museum grounds due to skateboarding damages, and recalled an instance of a broken window that was believed to be caused by skateboarders. When asked what measures are taken to deter street skateboarding at the Museum, Stephanie discussed some of the existing skateboarding mitigation strategies such as the no skateboarding signs, security cameras, and metal skate stoppers. Stephanie also discussed how in most instances of prohibited skateboarding at the plaza, typically the skateboarders are asked to leave by museum security. Stephanie couldn't recall any time the police had been called to respond to the skateboarders at the museum. Lastly, Stephanie discussed how skateboarders have even planned skate events online organizing large groups of skateboarders to meet at the Broad Art Museum.

In an effort to combat and resolve the street skateboarding conflict surrounding the Broad Art Museum, based on findings from this study's survey, landscape planting design strategies best fit for the Broad Art Museum are proposed for implementation throughout the Museum Plaza space. As expressed in the Figure 18 below, strategic lawn strips, hostile plantings, and hanging/ spreading planting design solution's implementation are shown in the museum's West

Plaza. After analyzing survey data as well as having observed existing mitigation strategies and existing skateboard related damages within the plaza, the plaza's seating ledge, planters, and banked wall have been redesigned making use of the effective landscape planting solutions determined best fit for the Museum Plaza. Based upon this study's survey testing each landscape planting design, these landscape planting solutions would be effective in deterring street skateboarding within the museum plaza.

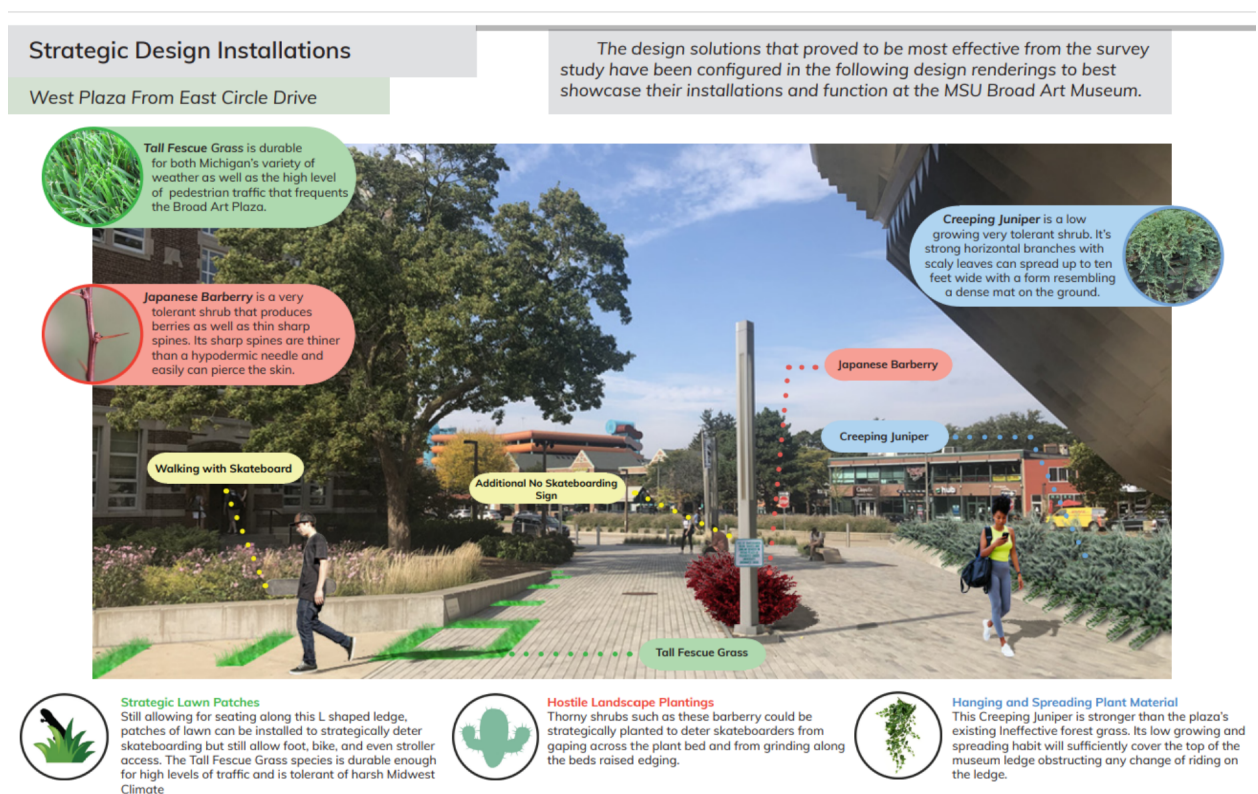


Figure 18: Planting Design and Implementation at MSU's Broad Art Museum

5.4 Future Research Direction

To further add to the knowledge and understanding of the conflict between street skateboarding and public spaces, further discussion and research could bring more solutions to better reduce the sports ongoing conflicts with public space. One area demanding further

investigation regarding this topic is undoubtedly the plant material selection. While this research focused on street skateboarding conflict at the MSU Broad Art Museum, plant material suitable for Michigan's diverse climate was selected. It must be understood that although the overall idea and function of each planting strategy may be transferable to other areas around the world, the plant material selected for this scenario may not be suitable for others. Depending on the climate as well as type of urban terrain or architecture making use of the planting strategy, an effective strategy in one setting may not be effective in another. Ultimately it is crucial that the plants are able to survive once installed to ensure the functional success of the planting strategy in deterring street skateboarding. For example, in warmer climates such as Arizona, perhaps hostile landscape plantings utilizing cactus plants could be more effective compared to the hostile plant material available in Michigan. With the proper planning and research of viable plant material and planting design strategy, the planting design strategies from this study could be effectively implemented around the world.

While this study captured and compared the perceptions from Skateboarders, Longboarders, and Non Skateboarders, reaching additional groups could provide a more complete understanding of effective deterrence regarding similar but different groups. For example, BMX riding, and Scooter riding also have a street style of riding that contributes to damages to property in urban public spaces. While these groups of riders are known to seek out and use similar terrain as street skateboarders, the landscape planting strategies may fail to have the same effect compared to the skateboarders due to the nature and riding habits of each specialized extreme sport. Expanding the reach of the survey might reveal further implementation of these planting deterrent strategies potentially further eliminating conflict between extreme sports and urban public spaces.

6.0 LIMITATIONS

The data collection phase of this study was completed during the global coronavirus pandemic. Because of this, many restrictions were implemented across the entirety of campus such as social distancing and even virtual learning formats. These new restrictions impacted the ways students used the campus most significantly by replacing many in person events with virtual events. Ultimately due to these circumstances, the ability to interact with and approach skateboarders to participate in the survey may have been impeded. Additionally, due to the large size of Michigan State's 5,000 + Acre campus and nearly 50,000 students. It was not feasible to gather responses from every willing skateboarder at Michigan State University. Because of this large population size 40 respondents may not sufficiently and accurately capture the entire consensus of street skateboarders at Michigan State University.

7.0 CONCLUSION

For decades now cities and other urban developed areas have faced challenges combating conflict resulting from street skateboarding in public spaces. From New York City to Philadelphia and Los Angeles and many places in between, street skateboarders have caused conflict, damage to property, and even have influenced politics and public policy as they skate within each area's public spaces. Street skateboarding coverage in mainstream media has allowed the sport to grow in popularity bringing the sport to its peak after recently debuting on the sports biggest stage yet at the Tokyo 2020 Summer Olympic Games. This performance on the world stage ultimately provided a new perspective for the world to see street skateboarding exist as a high level professional sport rather than the negative and disruptive skateboarding stereotype. In addition, by dividing skateboarding into two groups of good and bad skateboarding defined by (Nolan, 2003) and observing how skateboarding impacts youth sports and the communities they exist in explained by (Beak, 2017) findings from these studies will be used to grasp an understanding of the street skateboarding community and its implications across Michigan State University's campus.

This study aims to help eliminate the conflict between street skateboarding and public spaces while grasping an understanding of street skateboarding at Michigan State University to create design solutions best fit. This research targets city planners, designers, property owners, and other affected groups or areas, in eliminating conflict between their spaces and street skateboarding as they could take this study's findings into consideration when designing their next plaza, streetscape, or college campus. Bound to the area of Michigan State University, this research could be considered limited due to having a smaller population of street skateboarding compared to that of more popular skateboarding hot spots such as Los Angeles and New York

City. Although this studies results were limited only showing significant differences in perceptions between street skateboarders and non skateboarders in few instances relative to the skateboarder's self identification and the specific planting design strategies, it can be concluded that overhanging/spreading plantings are perceived as the most effective strategy overall while skateboarders perceptions vary from those of non skateboarders depending on the planting design strategy being tested. After having recently been added to the 2020 Summer Olympics, it is only certain that the sport will continue to grow and evolve, potentially further intensifying the ongoing conflict between skateboarding and urban public space. Future studies with similar interests in comparing groups of skateboarders and non skateboarders and comparing their perceptions on the urban environment could ultimately contribute to eliminating conflict between street skateboarders and urban public spaces.

8.0 CONFLICT OF INTEREST:

The author declares no conflict of interest.

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