

Perceptions of Urban Green Spaces: A Standard for Sustainable Design

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ABSTRACT

Urban green spaces (UGS) in our cities are designed and built with very little, almost zero consideration of sustainability and how efficiently it can improve the quality of life and well being of human beings. This paper focuses on creating a sustainable standard for urban green spaces that emphasizes exactly that. The research was structured to observe human interactions and perceptions of UGS via surveys and stakeholders via interviews. The standard was created to implement both sustainable factors and human standards among three categories: health, space, and function. Health: to meet human standards, an ugs should be clean and well maintained; sustainable standards, should not be depleting resources. Space: human standards, must be accessible and beautiful; sustainable standards, must be natural. Function: health standards, foster hobbies and heal; sustainable standards, boost activity and mood. This standard helps meet climate goals and provides incentives to legislation and companies for civilian happiness and employee productivity respectfully.

KEYWORDS

Parks, green buildings, city planning, green architecture, resilience

INTRODUCTION

Urban development has been rapidly increasing as more and more requirements are needed to be met by consumers to facilitate life and other daily needs (Liu and Weng 2013). Whether it be living spaces, parking lots, supermarkets and such, rapid urbanization is seen in a lot of countries. With rapid urbanization comes land cover changers and the introduction of gray space and infrastructure (Zhang et al. 2019). In turn, with the brand new abundance of gray space comes the loss of green space (Xu and Anwar 2013). Green space is a vital part of our lives and the need for it is immeasurable. For all those who live in urban areas where access to green space is much lower than what it should be, the effects after the loss of green space and the gain of gray space is felt much deeper (Escobedo and Nowak 2009). The development of gray space cannot be stopped as it facilitates much of our life as we know it. The creation of green spaces itself cannot even solve the problems we face with urban heat islands within our cities and climate change overall (Marando et al. 2022). What my research aims to accomplish is to create a standard for the development of sustainable green spaces that puts forward thinking into action. We must surround ourselves in sustainable design, gray or green spaces both, to improve not just our city's but our own health as well.

Land use changes have drastically changed many city layouts to benefit society. Most of these changes introduce unsustainable gray spaces to indulge in human needs and desires. Disasters have been striking with the lack of green space within multiple sectors within this field. It is seen in plant ecologies, facing major loss of life within their natural habitats and facing extinction (Vijayan et al. 2021). It can be seen in human communities where changes on the land can lead to urban heat islands, creating environments not suitable to accommodate life and support some land structures, built or not (Marando et al. 2022). The preservation and reintroduction of green space is crucial as well as changing and adapting them to fit and survive better in current standards of society and environment. Green spaces introduce and revitalize recreational value in this new age as well as maintain productivity, regulation, and stability (Escobedo et al. 2011).

Though plenty of research has been done to understand the natural science behind the importance of green spaces in urban areas, not enough studies have touched on the social sciences of urban green spaces (Han et al. 2020). And while we know that they enhance our

psychophysiological developments in ways such as providing a means of escape from a gray world to clear our minds and our bodies (Gascon et al. 2018), more work must be done in understanding what the benefits truly mean to us to create a substantial standard for urban green space. Green spaces reinforce our connection to our planet and can provide a solution to the advancement of modernization from a natural world. Understanding the mechanisms behind the impacts of green spaces with urbanization as an underlying topic is important in progressing into a cleaner and greener future (Ling and Chiang 2018). How we interact with green spaces and in turn what green spaces do for us is based on a system that has been in this world long before us (De Kleyn et al. 2020). How we move forward with land change needs and green space viability must maintain the balance of this system.

Living within access to a green space to better cultivate human life is extremely crucial in moving forward into an ever developing world. I aim to explore the different methodologies and perceptions in incorporating green space into urban areas to create a standard for UGS that will focus on the human connections. The standard will thus be created on the basis of three principles: appeal, association, and design. To provide data for these three principles I will be asking the community surrounding the UC Berkeley campus about (1)the certain variations in UGS design that are most appealing, (2)the aspects of UGS that create an association to the surrounding environment, and (3)current ways of how UGSs are being designed into projects. The term ‘project(s)’ will be used to refer to all structures within an urban environment, operational or during construction (buildings, parks, bridges, etc.).

EXTENDED INTRODUCTION

Urban green space through a contextual lens

To aid in understanding the importance of urban green spaces, a theoretical framework was conducted to provide further context.. A previous study has shown that urban green spaces greatly contribute to improving human well-being, especially in regards to health (Reyes-Riveros et al., 2021) (Figure 1).

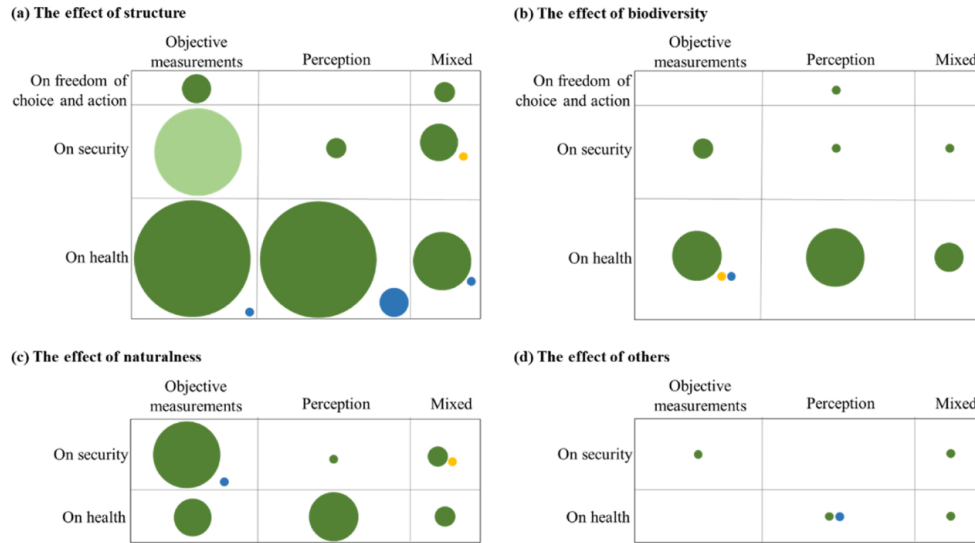


Figure 1. Effects of urban green spaces. Data on human well-being, strength of evidence, and methodologies (Reyes-Riveros et al., 2021).

This review focused on analyzing patterns in urban green space and human well-being, cross sectioning between the two under four categories each: structure, biodiversity, naturalness, and others for green space, and health, security, good social relations, and freedom of choice for human well-being. Another study focusing on the contribution of gardens to humans found that within garden settings, human wellness and multifunctionality increases through a concept called the ‘human-nature’ nexus (Hanson et al., 2021). Within cultural ecosystem services (CES), the study found that gardens as green spaces improve social bonds, recreation, nature experiences, and relaxation. Furthermore, past studies have shown the association between UGS and multifunctionality. A standard had been set forth on the Doua campus in Lyon, France, establishing green spaces that provide services such as provisions for the ecosystem, constant regulation, and overall sustainability within urban areas (Belmeziti et al., 2018). Within these three studies alone, a simple pattern can be found; a correlation between green spaces and positive psychophysiological well-being. I aim to gain a deeper understanding of this pattern found by previous researchers before me.

METHODS

Designing a strong research framework

Survey direction

The next step would be to understand the importance of the study subjects. I analyzed the perceptions and connections of urban green spaces and people within the UC Berkeley/City of Berkeley area. In scouring for ways to implement my methodology into practice, I found a paper that explored surveys through postal distributions (Sugiyama et al., 2013). Their method had a success rate of 11.5% with their entire study taking over 4 years. Needless to say, this will be a method that I will be avoiding at all costs. However, I did find a study done in 2022 that gave me insight into how to develop my methodologies. This study performed a successful and well-thought-out survey, using a mixed methods approach as a distribution method (Stoia et al., 2022). They distributed their survey online through Facebook groups within the focal community in addition to distributing physical as well as physical distributions of their surveys within their study site. They realized that physical distributions did not work out as well in getting people to fill out the surveys, as they would come up with excuses to avoid answering any questions such as “need for relaxation” or “lack of time”. This provided valuable information to the study as it provided evidence between the usage of green spaces. Another study used the best-worst scaling method (BWS) to construct their survey (Madureira et al., 2015). The BWS method provides context of a topic in relation to other issues. These methods of delivery and structure can prove to be useful in my own design.

Interview direction

Along with researching a general consensus on perceptions and connections of urban green spaces, I also aim to perform a deeper analysis of stakeholders within the green industry community. Stakeholders are important in understanding human perceptions and creating a standard as they hold more power and influence in how perceptions of UGS first occur (Mell et al., 2013). I interviewed and discussed the current implementation of green spaces within urban designs and the environment between people of various backgrounds within the green industry. Interviews are a strong qualitative assessment tool as they can provide in-depth understanding in many contexts, especially if based around a structured research hypothesis (Li et al., 2023). These interviews will be semi-structured, as previous data has shown success in these types of

interviews amongst people of a green space governance background (Nikolaïdou et al., 2016). My aim for these interviews is to include individuals from SITES, LEED, and TRUE, which are green building certifications. SITES focuses on all of the developmental processes into creating a sustainable project. LEED focuses on environmental impacts and the green design of a project. TRUE focuses on implementing zero-waste practices in projects and understanding zero-waste practices and procedures is important in caring for green spaces (such as turning waste into fertilizer and eliminating all waste in the designing of green spaces). Sustainability is a driving influence for my research. I not only want to look into ways on how to develop more green spaces in our cities, but also look into how to make those developments sustainable. Ultimately it is those spaces that provide the most impact in our lives and in combating climate change (Marando et al. 2022).

Survey data collection

My survey, a google form, was composed of questions that focus on the effects of UGS in the wellbeing of citizens primarily living in or having lived in urban spaces. I utilized a variety of question styles including select all, open ended questions, multiple choices, rankings, and demographic questions. I made sure to add the demographic questions at the end of the survey to ensure that the participants were engaged and focused throughout without any self-identifying biases that could affect their answers such as responding in tune with their race, gender, or other forms of identity expression. This popular approach helps mitigate the potential for demographic factors to unduly influence the participants' responses, allowing the data to more accurately reflect their genuine perspectives on the survey topics. These ended up totalling to 41 questions, not including demographics and 2 questions unnecessary to the research questions. These 2 questions were simply (1) asking if the participants understood the purpose of this survey and (2) asking if participants would like to participate in a raffle. There were 4 main sections to my survey: interactions, hobbies, effects and perceptions, and green buildings (not included was the intro to the survey section, demographics, and the raffle section). I included one \$50 amazon gift card obtainable through a raffle to incentivize responses. None of the questions in my survey were made mandatory to answer. This was done in consideration of my respondents' time, to make them feel more at ease, and to reduce a degree of invasiveness in case a question may induce signs of

discomfort or stress. To distribute my survey, I focused on delivering the survey through online channels. This was posted on social media sites, class discussions and groups, and passed around through friends to promote and distribute. I aimed for at least 30 survey responses given the allotted time it was out for ~1 month.

Interview design

I got in contact with 3 stakeholders of major green building certification programs, asking for their professional opinion on the subject matter at hand. Contact with 2 stakeholders were done as online interviews via Zoom and with the 3rd via email. For the interviews conducted over Zoom, I asked for permission to disclose information and record the interview for private use while keeping their personal-identities anonymous. The only identifying information that was disclosed would be their work-related positions. The questions asked were open-ended and focused on sustainability, design, implementation, and their opinions of what urban green spaces may be like in the future. I interviewed representatives from TRUE (Total Resource Use and Efficiency) Zero-Waste Certification and the Sustainable SITES Initiative. TRUE focuses on the zero-waste practices and design of green buildings. The interview questions were tailored towards the intersections between sustainability and waste management within UGS and any applicable practices from green buildings to UGS. SITES focus on sustainability as well but with a focus on the entire lot of a project. The interview questions were tailored to UGS, and some green buildings with an emphasis on greening, project design and their roles in sustainable infrastructure. The interviews with TRUE and SITES were kept short, a maximum of 30 minutes to keep everything digestible. This also makes it so that my interviewees don't get tired during the interview and start responding half-heartedly. My contact with the LEED (Leadership in Energy and Environmental Design) Certification was over email as I was unsuccessful in striking up a more formal interview. The questions were focused on green space resilience and design to gain insight of how green spaces respond to the challenges of time. All three certification programs I had gotten in contact with are all approved and in partnership with the US Green Building Council (USGBC).

RESULTS

Survey

The results of my survey concluded 38 responses from experiences of UGS within the cities of Berkeley, Oakland, San Francisco, and San Jose. In the section looking into interactions of participants among UGS, over half answered of being within the presence of a green space daily and with over 89% of participants at least once weekly. Most of the participants have claimed that those spaces are accessible and well maintained as well from where they live and from where they work or attend school.

In the section looking into hobbies of participants among UGS, 52.6% answered that they are usually within UGS for recreational purposes. 15.8% answered to escape from work/school and 10.5% answered to pass time (Figure 2). These are usually within small group settings (57.9% answered being with 1-2 people) or alone (28.9%). Most participants do not meet or maintain long lasting relationships with other people in these spaces, but those that do answer that these new people usually have a positive impact in their lives. 100% of participants answered that they enjoy the hobbies they partake in within UGS and feel better after. 97.3% of participants answer that being within the presence of UGS makes them look at life more positively (Figure 3).

What is the primary reason as to why you find yourself in the presence of a green space?

38 responses

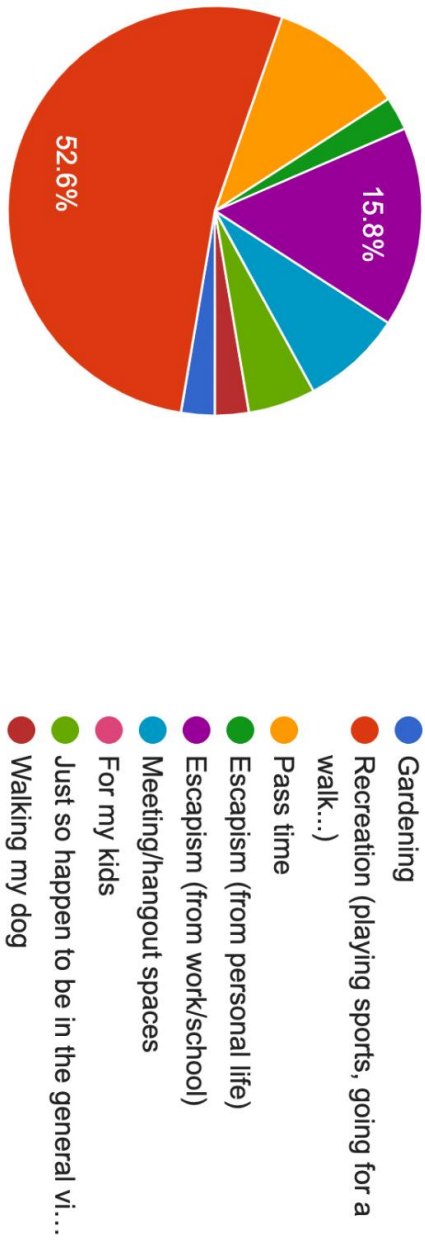
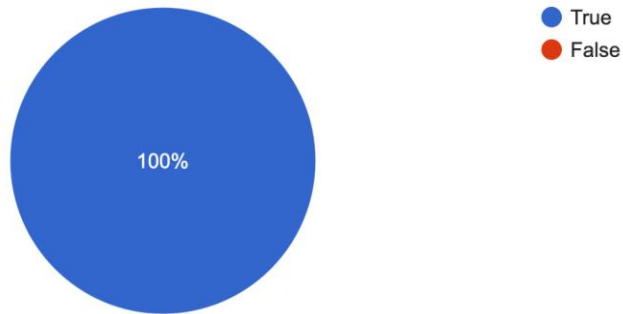


Figure 2. Hobbies in which participants partake in urban green spaces.

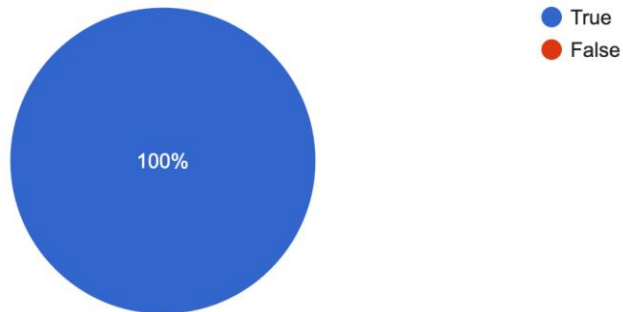
I enjoy the hobbies I indulge in within green spaces.

37 responses



I feel better after having visited a green space.

38 responses



I observe life in a more positive way within the presence of green spaces.

37 responses

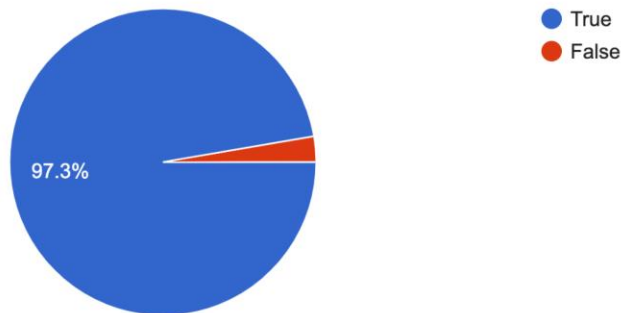
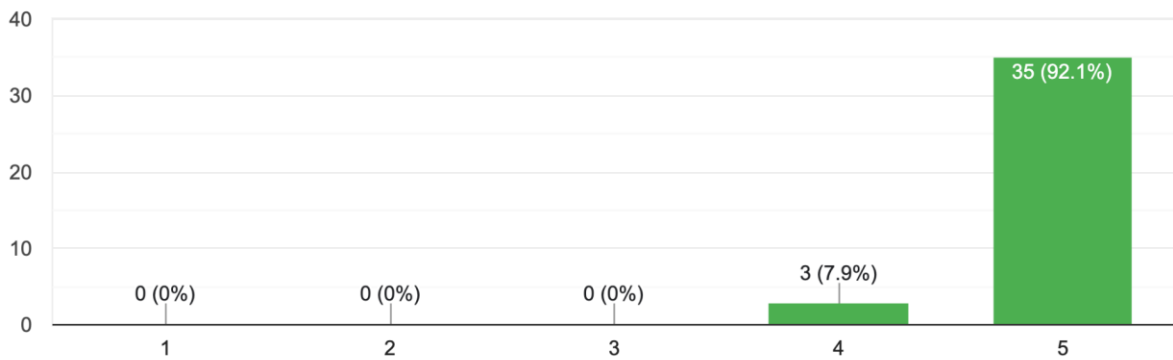


Figure 3. True or false statements. 3 graphs.

In the section looking into the effects and perceptions of UGS, 92.2% of participants answer they view UGS as spaces to heal. 55.2% of participants answer they need view or easy access to UGS to work with a clear head. 86.5% of participants answer they utilize UGS to better mental, emotional, and physical well being. At least 78.9% of participants strongly believe that UGS are mandatory features in urban spaces, for the development of life, for the improvement of quality of life, and for the betterment of individual, societal, and environmental health (Figure 4). 84.2% of participants answered that they find themselves cooler being within UGS than being within gray spaces. (Table 1)

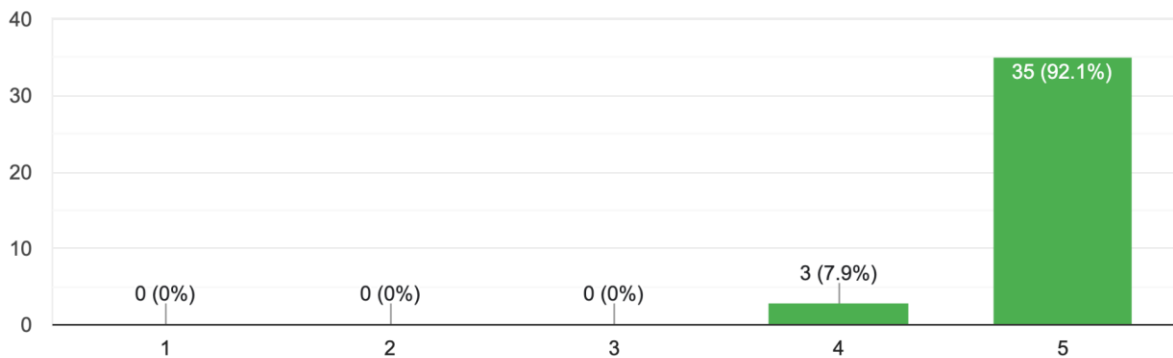
How strongly do you agree with the statement: Green spaces are mandatory in the development of life.

38 responses



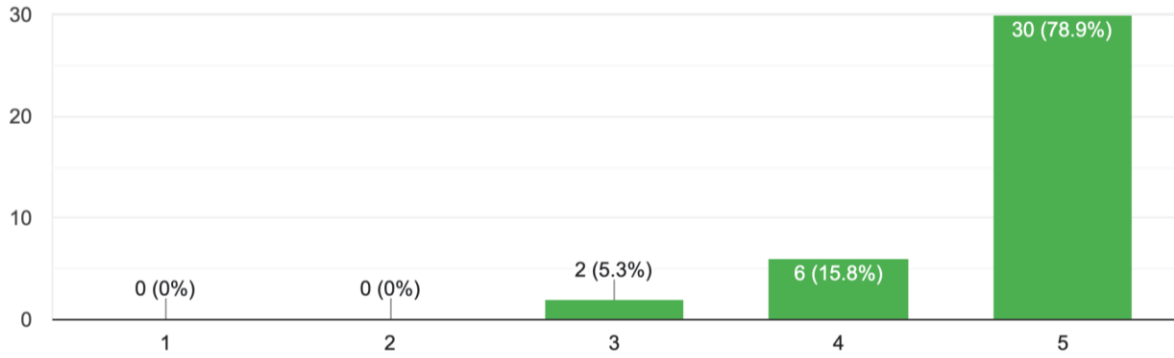
How strongly do you agree with the statement: Green spaces are mandatory in the development of life.

38 responses



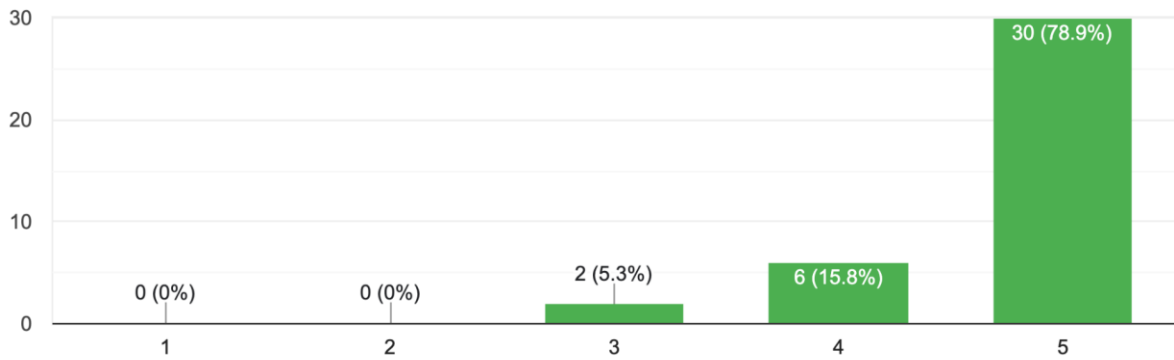
How strongly do you agree with the statement: Green spaces are mandatory in the improvement of quality of life.

38 responses



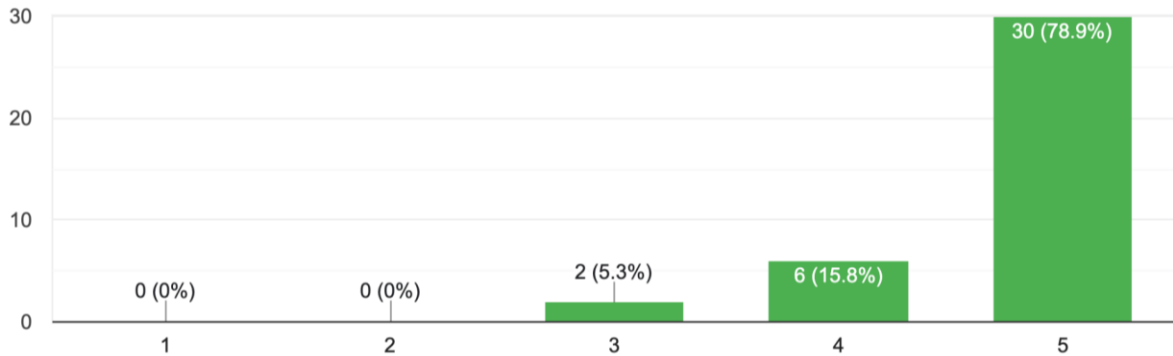
How strongly do you agree with the statement: Green spaces are mandatory in individual human health.

38 responses



How strongly do you agree with the statement: Green spaces are mandatory in societal health.

38 responses



How strongly do you agree with the statement: Green spaces are mandatory in environmental health.

38 responses

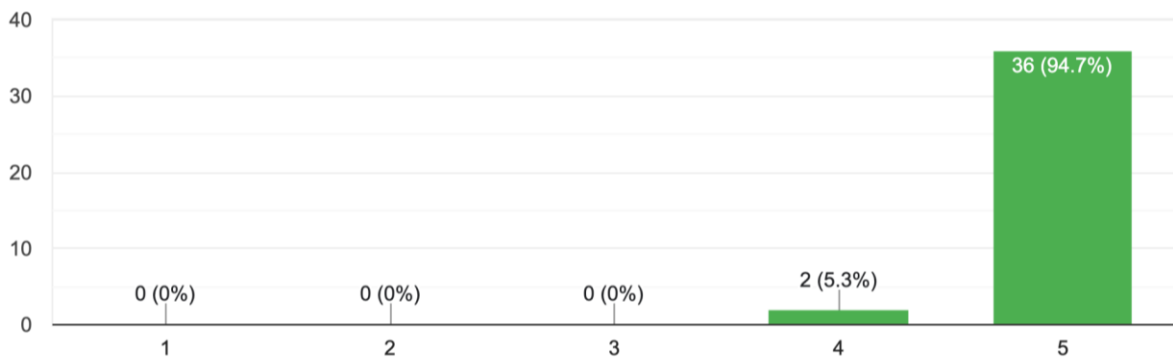


Figure 4. Statements. Urban green spaces as mandatory spaces. 6 graphs.

Table 1. Quotes from the Survey. Selected quotes are representative of other quotes from the survey.

Question	Quote
“Do you view green spaces as spaces to heal?”	“I can reconnect with who I truly am and what I truly enjoy/feel!! That's hard to do when I'm swept up in my daily routines and responsibilities.”
“Do you view green spaces as spaces to heal?”	“Especially at green spaces with a nice view, I get a little emotional and spiritual and it makes me feel grateful to be alive. It is very healing when I feel down and feel a little hopeless.”

<p>“Do you need view or easy access to a green space to do work with a clear head?”</p>	<p>“I can work in places without view/access to green spaces but it feels more draining when compared to working in places with view/access to green spaces.”</p>
<p>“Do you utilize green spaces to better mental, emotional, and physical well being?”</p>	<p>“Helps me breathe easier, feel happier, take life less seriously, and relieve stress”</p>

In the section looking into green buildings, 60.5% of participants answered that they heard of the term “Green Building” before but only 63.2% answered that they don’t know of any building certifications. 13.1% of participants consider themselves knowledgeable on sustainable design. 86.1% of participants answered that they are knowledgeable on human impacts on the environment 39.5% answered knowledgeable on the topic of urban heat islands. 80.6% of participants answered that they are unaware of a green space that has been designed for long term sustainability and resilience.

Interviews

The interview with TRUE mentioned how their sustainability measures for projects can be implemented into green spaces in three main ways: xeriscaping, grasscycling, and composting. Xeriscaping and grasscycling are part of TRUEs Reduce Credit (7 and 6 respectively) while Compost itself is its own credit (Re-Earth). Meeting credits are how projects gain points for the certification system. Landscaping and keeping native plants in our ecosystems are vital practices for xeriscaping as they help reduce water waste and improve long term resilience. Grasscycling removes grass trimmings from landfills and promotes better growth, ultimately reducing water waste as well. Composting focuses on keeping compost away from landfills which reduce greenhouse gasses. (Table 2)

Table 2. Quotes from TRUE. Selected standout quotes from interview topics with TRUE.

Topic	Quote
Design	“...no thinking in our parks and green spaces for where those trash cans are and how many there should be.”
Legislation	“...cities and politicians do not want to push back on developers and most of them are not educated in urban planning...”
Legislation	“So I think legislatively, if a general plan is cast by the citizens it should have a lot more enforcement and a lot more penalties. Because we don't want the developer to pay the penalty, we want the penalty to be so big that they won't even try to do it.”
Design	“sometimes your greenspace can be inside your building it doesn't actually have to be outside right; so I think that is really exciting”

The interview with SITES mentioned three factors that are important to UGS design: spatial occupancy, symbiosis, and technological innovations. Spatial occupancy focuses on how UGS exists in the land and how it interacts with us from where it is placed and built. Symbiosis focuses on how UGS and green buildings interact with each other. Technological innovations are important as we move more into the future. It provides us with modern solutions to (modern) problems that have arisen from anthropogenic issues. (Table 3)

Table 3. Quotes from SITES. Selected standout quotes from interview topics with SITES.

Topic	Quote
Design	“You can intentionally design a landscape, you can train your construction crew, preserve old growth trees, restore wetlands, do all those things as you're creating, rebuilding, destroying a space and if it's not properly managed it can destroy your potential.”
Perceptions	“The world is now really recognizing the value of nature based

	solutions. The idea is not [to] just do less harm, it's actually do more good.”
Design	“We see a lot of exotic plantings in some places that require more water, more maintenance, or more pesticides to maintain; that's not a natural environment. Whether you’re in a desert biome, rainforest biome, wherever you are, it’s critically important for our survival that we exist in a space as the space exists.”
Green Buildings	“I would say the relationship between the green buildings and green spaces is that of interconnectivity and mutual support; the idea is that they are symbiotic.”
Design	“...make sure that the site value doesn't get engineered out, when you are planning something you don't [the value to get] engineered out the landscape.”

Both interviewees mentioned two spaces that can be better designed in the future to incorporate UGS: rooftops and indoor spaces. Both are untapped markets in most buildings.

The interview with LEED focused on resilience and responses of UGS to disasters. Lots damaged by disasters such as flooding (or under any circumstance hypothetically) can be replaced with parks or other green spaces for quick and easy repair. These provide positive benefits to society such as joining together the local communities around the lot.

DISCUSSION

Survey analysis

Participants who visit UGS more than others in my survey also report having their respective UGS being accessible and well-maintained. This is important because it goes to show

how accessibility and maintenance affects UGS usage: more accessible and maintained UGS lead to more people within those spaces.

While in the presence of green spaces, over half of the participants recorded partaking in recreational activities. Taking this into account, UGS must be able to foster homes for hobbies as well. This is further supported by all participants answering feeling better during and after partaking in their hobbies. Participants also answered being in UGS for escapism and to pass time. This can be done in any green space even with no special amenities to it so these hobbies can be compounded with recreational activities. Nearly all participants as well answered looking at life more positively after having visited an UGS. All of this is important as it relates to the functionality of a green space: UGS must be spaces that can foster various kinds of hobbies for people. The effects of accessibility and maintenance, and space for recreational activity are topics hardly touched in green space and even green building design research. It's extremely interesting to note how well my study reflected an earlier working thesis of mine that believed in a strong relationship between UGS usage and accessibility, usage and maintenance, and usage and ties with recreational activities.

Focusing on the health aspects of UGS, nearly all participants view and use UGS to heal. Most participants believe that UGS are mandatory in various aspects that heal and improve life. Over half of the participants work better in the presence of UGS and nearly all feel cooler as well. These perceptions show just how UGS can act as sanctuaries for people for the betterment of all forms of health: individual, societal, environmental, and work. These perceptions line up with the study conducted by Reyes-Riveros et al. as seen in Figure 1 (Reyes-Riveros et al., 2021) (Figure 1). The cross-sectional studies between perceptions of UGS and health is important in decision making for our city planners, and even more so when backed up by our civilians.

Participants have noted being mostly unaware of sustainable designs and devices used for green buildings while understanding the anthropogenic effects humans have on the environment. Most are unaware of a green space built with sustainable measures. This is important to note as there is no mainstream green space certification based on sustainability as there are with green buildings. This leaves plenty of room of study in the future as well as a potential hope for UGS Certification programs.

Interview analysis

Understanding how green building certification programs work is important as it provides an example of how a sustainable standard should be like for UGS. TRUE, SITES, and LEED are all very meticulous in their projects and always aim for the highest possible standards.

UGS could be able to be maintainant and cost efficient if we adopt some of their practices. Keeping in mind the state of California's special needs, it is extremely important to keep native plants in and exotic plants out. Plants not native to California's soil require more water than our native ones do as we are a drought-heavy, mainly chaparral state. Exotic plants will only destroy our ecosystems and create more water problems for us. Practices such as grasscycling where we promote growth and conservation through a very simple method is needed in maintaining our UGS. It helps keep compost away from our landfills which in turn reduce GHG while also being a cost effective way of fertilizing the green spaces. Adopting other green practices such as growing food onsite can not only keep composting within our spaces but also provide hobbies for people to participate in.

UGS should be able to function as spaces that promote healthy daily living practices. Expedia Group HQ in Seattle is a great example of how a green space is incorporated into a green building design to better the well-being of people. During the design and development stages of this project, designers looked into the effects of incorporating green spaces into projects and found there to be a positive impact. It provides a better work environment, better work quality, and reduced absences. Green spaces and green buildings have a special relationship with one another and that can also be seen in Shoemaker Green in UPenn. That green space was designed with the intent of being a contingency plan for flooding events with 100 to 500 year scenarios. Looking into the future is mandatory in regards to resilience and sustainability. Another way to do so is to look into how technology can play a role in this. The Pathfinder App by Climate Positive Design provides a measurement on how green your space is. They provide analyses on how much more work your project needs to achieve carbon net neutrality.

It's important to note the more untraditional places where UGS can grow. Asking questions such as 'What else can we turn this lot into while keeping its core principle the same?' can provide answers for more green spaces. It's not about the parking lot, it's about what else can the parking lot be. Rooftops and indoor spaces provide us with spaces for green to grow. Growing UGS between buildings, especially tall ones, can be challenging as sunlight can be blocked at certain

times of the day. Rooftops help us solve that problem while also being space efficient. UGS don't have to be outdoors as well. Growing walls and designated greenery inside buildings also work; and they spruce up the indoor environment as well.

LIMITATIONS

This study was conducted through the usage of my own personal funding and accessibility to both scholarly and professional resources. My choice of setting and population was very limited and not well diversified due to a lack of professional guidance and aid in promotion. Additionally, adding support from professionals in other fields such as psychoanalysts for aid in survey analysis will provide useful and more accurate data.

FUTURE DIRECTIONS

Experts needed from across multiple disciplines would be viable in understanding the thesis at its best scenario. An experienced urban planner and a sustainability-focused development designer/architect would provide near-perfect analysis of any findings related to the sustainability, resilience, and quality of a green space due to their professional foundation of the topic. A professional well-being patterns analyst is crucial in understanding human behavior surrounding green spaces. Research funding and accessibility to proper tools and resources can vastly improve any findings. A larger and more diverse sample population from a more general city, unlike a college city like Berkeley, is needed if looking to represent urban environments as a whole.

CONCLUSION

There is much to be changed in the way cities all across the world are set up. A lack of urban green space with growing populations and human needs results in faults within many urban ecosystem structures. Problems surrounding human well-being and climate change have the potential to be solved to a degree with the proper implementation of sustainable UGS. This is, however, a problem that goes beyond sustainable needs and development. The history of racism

and red-lining must be addressed and dismantled for proper and unbiased implementation of UGS. The world needs more sustainable UGS that not only provide benefits to the environment, but to humans as well.

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APPENDIX A: Survey

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Green Space Interactions - ES Senior Thesis

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This is a survey focused on understanding the interactions between humans and green spaces.

Participation is **completely voluntary**. Responses and statistics are all **anonymous**. You are free to skip any questions you'd like.

Estimated time to complete this survey should be 5-10 minutes, with 10 minutes involving "deep" thought.

If you wish to learn more about the subject matter, or to simply share more information I may have missed considering, feel free to contact me with the subject line "ES Survey" at: joshuachan@berkeley.edu

Thank you for your time and effort. You may be included in a **\$50 Amazon gift card** raffle for your participation if interested.

* Indicates required question

1. I understand the above statement. *

Mark only one oval.

Yes

Green Space Interactions

Urban Green Space: an area in urban environments dedicated for plant life such as grass, trees, and other vegetation.

Examples: parks, lawns, gardens, plazas, tree-belts...

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2. How did you come to know of this survey?

Mark only one oval.

- Online posting
- Link from friend
- QR code posting
- Other: _____

3. Which city do you live in now?

Mark only one oval.

- Berkeley
- Oakland
- San Francisco
- San Jose
- Other: _____

4. How often do you find yourself within the presence of a green space?

Mark only one oval.

- Daily
- Couple times a week
- Once a week
- Couples times a month
- Once a month
- Once every couple months

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5. How accessible are green spaces based on where you live?

Mark only one oval.

1 2 3 4 5 6 7

Hard Easy to access

6. How maintained are those green spaces above (based on your observations)?

Mark only one oval.

1 2 3 4 5 6 7

Hard Well maintained

7. How accessible are green spaces based on where you work/go to school?

Mark only one oval.

1 2 3 4 5 6 7

Hard Easy to access

8. How maintained are those green spaces above (based on your observations)?

Mark only one oval.

1 2 3 4 5 6 7

Hard Well maintained

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9. Rank these green spaces based on personal preference (1 being most favorite and 10 being least).

Mark only one oval per row.

	1	2	3	4	5	6	7	8	9	10
Rooftop Gardens	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Private Gardens (including private lawns)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Public Gardens	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Greenhouses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Parks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Urban Forests	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Public Lawns	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Side-walk greenery & Tree-belts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Plazas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cemeteries	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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- 10. List any green space I have missed above and place the number in which you would have ranked them.

Green Space Hobbies

Urban Green Space: an area in urban environments dedicated for plant life such as grass, trees, and other vegetation.

Examples: parks, lawns, gardens, plazas, tree-belts...

- 11. What is the primary reason as to why you find yourself in the presence of a green space?

Mark only one oval.

- Gardening
- Recreation (playing sports, going for a walk...)
- Pass time
- Escapism (from personal life)
- Escapism (from work/school)
- Meeting/hangout spaces
- For my kids
- Just so happen to be in the general vicinity
- Other: _____

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12. How many people are you usually with during the activities above?

Mark only one oval.

- 0
- 1-2
- 3-5
- 6-9
- 10+

13. Do you often meet new people in these spaces?

Mark only one oval.

	1	2	3	4	5	6	7	
Never	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Often

14. Have there ever been long lasting bonds to those you have met in these spaces?

Mark only one oval.

- Yes (over a year)
- Yes (over 6 months)
- Yes (over a month)
- Yes (at or under a month)
- No
- N/A

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15. Do you view the people you have met in these spaces to have had a positive impact in your life?

Mark only one oval.

Yes

No

N/A

16. I enjoy meeting new people.

Mark only one oval.

True

False

17. I enjoy the hobbies I indulge in within green spaces.

Mark only one oval.

True

False

18. I observe life in a more positive way within the presence of green spaces.

Mark only one oval.

True

False

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19. I feel better after having visited a green space.

Mark only one oval.

- True
- False

Green Space Effects and Perceptions

Urban Green Space: an area in urban environments dedicated for plant life such as grass, trees, and other vegetation.

Examples: parks, lawns, gardens, plazas, tree-belts...

20. Do you view green spaces as a spaces to heal?

Mark only one oval.

1 2 3 4 5 6 7

Not Very healing

21. Could you expand on the answer above?

22. Do you need view or easy access to a green space to do work with a clear head?

Mark only one oval.

1 2 3 4 5 6 7

Not Mandatory

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23. Could you expand on the answer above?

24. Do you utilize green spaces to better mental, emotional, and physical well being?

Mark only one oval.

1 2 3 4 5 6 7

Not It is much needed

25. Could you expand on the answer above?

26. How strongly do you agree with the statement: Green spaces are mandatory features of any and all urban spaces.

Mark only one oval.

1 2 3 4 5

Stro Strongly Agree

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27. How strongly do you agree with the statement: Green spaces are mandatory in the development of life.

Mark only one oval.

1 2 3 4 5

Stro Strongly Agree

28. How strongly do you agree with the statement: Green spaces are mandatory in the improvement of quality of life.

Mark only one oval.

1 2 3 4 5

Stro Strongly Agree

29. How strongly do you agree with the statement: Green spaces are mandatory in individual human health.

Mark only one oval.

1 2 3 4 5

Stro Strongly Agree

30. How strongly do you agree with the statement: Green spaces are mandatory in societal health.

Mark only one oval.

1 2 3 4 5

Stro Strongly Agree

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- 31. How strongly do you agree with the statement: Green spaces are mandatory in environmental health.

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

- 32. When outside, do you find being within green spaces cooler in temperature vs being within gray spaces?
 Gray spaces: any space outside of green spaces that has been urbanized (streets, buildings, sidewalks...)

Mark only one oval.

1 2 3 4 5 6 7

Insufficiently Yes, to a considerable degree

- 33. Use this space to talk about anything pertaining to **your own views** of urban green spaces.

Green Buildings

Green Buildings: projects designed for long term sustainability with resource-efficient practices. These projects are deemed environmentally responsible from design and construction, all the way to operation and demolition.

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34. Have you heard of the term "Green Building" before?

Mark only one oval.

Yes

No

35. Have you heard of any building certifications before?

Mark only one oval.

Yes

No

36. If yes, could you list which certifications you have heard of?

37. How knowledgeable do you consider yourself to be on the topic of sustainable design?

Mark only one oval.

1 2 3 4 5 6 7

Not Very knowledgeable

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38. How knowledgeable do you consider yourself to be on the topic of human impacts on the environment?

Mark only one oval.

1 2 3 4 5 6 7

Not Very knowledgeable

39. How knowledgeable do you consider yourself to be on the topic of urban heat islands?

Mark only one oval.

1 2 3 4 5 6 7

Not Very knowledgeable

40. Are you aware of any green space that has been designed for long term sustainability and resilience?

Mark only one oval.

Yes
 No

41. If yes, could you name those spaces?

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42. Use this space to talk about anything pertaining to **your own views** of green buildings.

Demographics

43. What is your age?

Mark only one oval.

- <18
- 18-22
- 22-27
- 28-32
- 33-39
- 40-50
- 50+

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44. What is your gender?

Mark only one oval.

- Female
- Female non-conforming
- Male
- Male non-conforming
- Non-binary
- Gender-fluid
- Other: _____

45. What is your work related position?

Mark only one oval.

- Unemployed
- Employed: part-time
- Employed: full-time
- Research
- Other: _____

46. What is your current level of education?

Mark only one oval.

- Highschool
- Undergraduate
- Graduate
- PhD

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47. Are you Hispanic or Latino?

Mark only one oval.

Yes

No

48. How do you identify yourself as?

Check all that apply.

American Indian or Alaska Native

Asian

Black or African

Native Hawaiian or other Pacific Islander

White

49. Are you a parent?

Mark only one oval.

Yes

No

50. If yes, how many kids do you have?

Mark only one oval.

1

2

3

4

5

6+

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Raffle

- 51. Enter your email address if you'd like to participate in the raffle for a \$50 Amazon gift card.

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APPENDIX B: Interview Questions

Interview with TRUE

Background information and line of work?

What are some zero waste practices implemented into green spaces?

Have any of these immensely reduced civilian waste?

How has signage been?

What role does sustainability play in preserving green spaces?

Is there a correlation between how sustainably fit a project is and how that correlates with human well being?

Interview with SITES

Background information and line of work?

Your interactions, relationships, and perceptions of ugs?

What is the relationship in sustainability between ugs and resilience to wear?

What are some ways ugs have been incorporated into projects?

What are some innovations of ugs you have seen?

What is the relationship between ugs and green buildings?

How do you think ugs will change over time?