ABSTRACT

Title of thesis:	Choice Experiments and Design Decision-Making
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There is a growing interest in evidence-based design in landscape architecture. This is an exploratory study of the choice experiment method: an economic approach used by many other disciplines but not yet landscape architecture, to collect empirical evidence on the public's preferences for different landscape design characteristics. A choice experiment was conducted for an open space development in downtown Baltimore. The outcomes of the experiment provided a basis for the design of a downtown surface parking lot into a public open space. Design decisions were made with better clarity and confidence that the design solution could maximize utility and value to the public.

CHOICE EXPERIMENTS

AND

DESIGN DECISION-MAKING

by

Robyn Edwards

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1 Introduction

There is growing interest in evidence-based design in landscape architecture. When designing for specific user groups, types of situations and sites, it is increasingly expected that landscape architects base their work on an evidence-based approach (Brown & Corry, 2011). Evidence-based design can enrich the design process and outcomes by providing decision makers with additional information that can be incorporated into the design analysis thus reducing uncertainty around a decision. Advancement in landscape architecture research can be complemented by developments in other disciplines such as psychology, marketing, decision theory and statistics. Mehrhoff (1999) stresses that an intellectual framework to evaluate decisions around participation and creativity is useful to frame choices with clarity and integrity.

This thesis is an exploratory study of using the choice experiment technique to elicit the public's preferences for different landscape design characteristics. Choice experiments (CEs) are one method of gaining evidence of public preferences where individual preferences count. Various studies and applications across many disciplines have been identified that show that choice experiments are a promising way to elicit preferences when various public policies and projects are under consideration. By exploring the application of the CE approach for landscape design, it is possible that the CE technique maybe a practical analytical tool for assisting with design choices.

This study seeks out choice information in order to design for the public with more confidence of a successful outcome. As part of the methodology, important and relevant landscape design attributes are identified that influence demand by the public for open space development.

The study focuses on the following objectives:

- Introducing the choice experiment methodology to the landscape architecture discipline.
- Obtaining evidence of people's preferences and values for urban open space design.
- Incorporating the choice experiment results into the design decision-making process leading to the design of an urban open space outcome.

An open space development in downtown Baltimore is used in this investigation. Design concept alternatives are presented for the study site based on the empirical evidence from the choice experiment.

1.1   Organization of the Thesis

The organization of the thesis is as follows. Chapter 2 is the literature review where the rationale and methods for engaging the public in decision making for the development of a public open space is outlined. This chapter also discusses the theoretical framework for valuing public open space and introduces the

choice experiment method as a suitable method for valuing public open space characteristics.

Chapter 3 outlines the choice experiment. Methods to determine the attributes used in the study are discussed along with the experimental design, questionnaire design, sampling and implementation. The results are presented with their interpretation.

Chapter 4 presents design alternatives for the public open space based on the empirical evidence from the experiment. This chapter also includes site analysis and research typical in the design process.

Chapter 5 concludes the thesis by summarizing the study and discussing the implications for CE in the landscape architecture design process.

1.2   Key Terms

Stated preferences, choice experiment, discrete choice, utility, public open space, public participation, evidence-based design, decision making

2   Literature Review

2.1   Public Participation and Decision Making

When designing a public space, a major goal of the designer is to create a quality space that meets the user needs for comfort, safety, enjoyment, and meaning. Furthermore, public spaces should be accessible to all people who might wish to be there (Francis 2003).

To achieve this goal, a common approach used today in landscape architecture is to include the public in the planning and design phases of a project. Participatory practice, also known as participatory planning, public involvement, citizen engagement and collaborative decision-making, has emerged from many disciplines, across many sectors and is not unique to landscape architecture. The practice has grown more and more across the board as organizations are finding they can get significantly better results using participatory methods rather than traditional policy development and project management (Involve, 2005).

The benefits of broad-based community involvement in planning and design are widely documented (e.g. Altschuler, 1970; McClure, 1997; Sanoff, 2000, 1991; Smith, 1993; Towers, 2003).   Participation methods can be employed simply in recognition of the need to involve the public in some way (Wiedemann and Femers 1993).   For example, participation in environmental impact assessment, with or without a strong design component, is required in many publicly funded

projects, usually by inviting developers, academics, non-profit watershed councils or environmental organizations, and the general public (Palerm 2000).

Participatory design is also used as a way to 'enable' as well as 'deliver'. Participation research provides evidence that when people are involved in decision-making processes, they are more likely to support the implementation of related policies and projects (Potapchuk, 1996).

In its case study series, the Landscape Architecture Foundation states that "ultimately participation should contribute to strengthen democracy, improve the quality of public goods and services, build stronger communities and tackle complex problems". Democratic societies, such as the United States, operate in an environment conditioned on the value judgment that individual preferences count (Hensher and Johnson, 1981). Irvin and Stansbury (2004) describe the advantages of citizen participation as leading to more public-preference decision making on the part of the administrators and a better appreciation of the larger community among the public.

The practice of public participation can involve public hearings, community workshops, charettes, surveys, open houses, stakeholder meetings, focus groups and other forms of direct involvement with the public. A new generation of public participation utilizes Internet based participation tools. However, as White (1996) suggests, professional experts and public agencies generally

develop and manage open space planning and design with a relatively limited depth of public participation considering what is possible.

Not all participation opportunities are equal, however. Participants are rarely equal in terms of knowledge of a topic, and may have diverse backgrounds, needs and expectations. Citizens who choose to participate have the opportunity to determine the final policy outcome by means of the participation process (Berry et al., 1993).

A choice experiment is a survey based participatory approach where individual preferences count. According to Rowe and Frewer's (2000) evaluation of participation methods, surveys take little citizen time and fewer resources than many other procedures, are cost effective and provide a high level of general capability in representing a large population. By using a choice experiment instrument that is well designed and includes visual and summary-based information, participation may be further increased, as citizens are cognitively and democratically able to participate.

2.2   Choice Experiment Framework

2.2.1   Background

Initially developed by Louviere and Hensher (1982) and Louviere and Woodworth (1983) in the marketing and economics of transport literature, choice experiments resulted from the advances in many different disciplines: axiomatic conjoint

measurement and information integration theory in psychology, random utility theory-based discrete choice models in economics, and discrete multivariate models for contingency tables and optimal experimental design in statistics (Lancsar and Louviere, 2008). The theoretical underpinnings contain elements of the traditional microeconomic theory of consumer behavior and Lancaster's (1966, 1971) theory of demand, welfare theory and consumer theory (Louviere et al., 2002; Bateman et al., 2002).

The wide-ranging applications to problems of qualitative choice regarding the environment, transportation, and marketing, have given rise to a large body of choice experiment (CE) literature in these fields. The use of CEs has grown rapidly and the ability of the technique to explore how the welfare of society changes in response to marginal changes in the provision of public goods has been recognized by policy makers in many countries (Adamowicz et al., 1998; Bennett and Blamey, 2001; Horne and Petajisto, 2003; Colombo et al., 2005; Hanley et al., 2006; Bateman et al., 2002).

Choice experiments typically consist of numerous respondents being asked to complete a number of choice tasks (referred to as choice sets) in which they are asked to select an alternative from a finite set of alternatives (discrete choice). Each option in a choice set is described by a set of attributes or characteristics, each with some number of levels. The individual's attention is focused on the tradeoffs between attributes that are implicit in making a choice (Champ et al.,

2003).   Figure 1 provides an example of a choice question that asks a respondent to choose their most preferred shoe alternative. Each shoe is described by a set of characteristics.

Figure 1: Choice Question Example
Example of a choice question used in a questionnaire to elicit preferences for shoe characteristics.

Option A	Option B	Option C
		Neither Option A nor Option B. Given these options I would prefer to not buy new shoes.
Main color: Green Material: Leather Sole color: White Fastener: Laces Price: $120.00	Main color: White Material: Leather Solte color: Brown Fastener: Velcro Price: $87.00	No purchase
Which would you choose?		
☐	☐	☐

The CE approach to preference elicitation is similar to the choice-based approach to consumer theory. It explicitly assumes that respondents' observed choices in the experiment reveal the preferences of the individuals. To arrive at a choice, an individual must have considered a set of alternatives. Individual decisions are determined by the attributes or characteristics of a good or service. It is assumed that respondents' choices reveal the preferences of the individual.

By evaluating a set of multiple attributes, an individual will choose the alternative that generates the highest utility. The extent to which the different attribute levels influence choice can be determined by presenting a respondent with a range of choice sets.

Discrete choice models are based on utility maximization. The random utility approach, developed by McFadden (1974), is used to link the deterministic model with a statistical model of human behavior. The randomness of the utility function suggests that analysis of the probability of choosing one alternative over another is possible. In a scenario that only consists of two open space choice s per choice set, j or l, this means that the chosen open space must give the individual greater utility compared with other open spaces. If the utility of individual i choosing open space j is represented as U_{ij}, then open space j will be chosen if and only if $U_{ij} > U_{il}$ for $j \neq l$.

Because researchers do not know U_{ij}, the individual's true utility, they cannot tell for sure which open space an individual will eventually choose. U_{ij} consists of two components, the observable and the unobservable components:

$$U_{ij} = V_{ij} + \varepsilon_{ij}. \qquad\qquad (1)$$

In Equation (1), U_{ij} consists of a predicted utility, V_{ij}, observable based on the choice's attributes, and an unobserved random component, ε_{ij}. If ε_{ij} were known, researchers would know U_{ij} and could tell for sure which open space would be chosen. Since researchers do not know ε_{ij}, the best they can do is predict the final outcome in terms of probability.

The probability of individual i choosing state j can be described as:

$$
\begin{aligned}
P_{ij} \quad &= P(U_{ij} > U_{il}) \\
&= P((V_{ij} + \varepsilon_{ij}) > (V_{il} + \varepsilon_{il}) \\
&= P((\varepsilon_{il} - \varepsilon_{ij}) < (V_{ij} - V_{il})) \; \text{for all } j \neq l. \quad (2)
\end{aligned}
$$

To solve Equation (2) a probability density function must be imposed on ε_{ij}. Each type of probability distribution leads to a different discrete choice model.

A comprehensive overview of the choice valuation method and its models can be found in Ben-Akiva and Lerman (1985); Louviere et al. (2000); Train (2009); Hensher et al. (2005); Kanninen (2007) and Cushing (2007).

2.2.2 Stages in a Choice Experiment

A choice experiment has several key stages including identification of attributes (design characteristics) and assignment of levels; deciding what choices to present to individuals (the design); development and administration of the survey (data collection); data input and analysis and interpretation. A comprehensive overview of this valuation method can be found in Ben-Akiva and Lerman (1985); Louviere et al. (2000); Train (2009); Hensher et al. (2005); and Kanninen (2007) . Figure 2 below shows the main stages in a choice experiment.

Figure 2: Stages of a Choice Experiment

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                    ┌──────────────────────┐
                    │ 1. Research Question │
                    └──────────┬───────────┘
                               │
                    ┌──────────▼───────────┐
                    │ 2. Attributes and    │
                    │    Levels            │
                    └──────────┬───────────┘
         ┌─────────────────────┼─────────────────────┐
         │                     │                     │
┌────────▼────────┐  ┌─────────▼─────────┐  ┌────────▼─────────┐
│ 3. Profile      │◄─►│ 4. Experimental   │◄─►│ 5. Preference   │
│    Construction │  │    Design         │  │    Elicitation   │
└────────┬────────┘  └─────────┬─────────┘  └────────┬─────────┘
         └──────────┬──────────┘            ┌────────┘
                    │                       │
         ┌──────────▼────────┐   ┌──────────▼────────┐
         │ 6. Instrument     │◄─►│ 7. Data           │
         │    Design         │   │    Collection     │
         └──────────┬────────┘   └──────────┬────────┘
                    │                       │
         ┌──────────▼────────┐   ┌──────────▼────────┐
         │ 6. Statistical    │◄─►│ 7. Results and    │
         │    Analysis       │   │    Conclusions    │
         └───────────────────┘   └───────────────────┘
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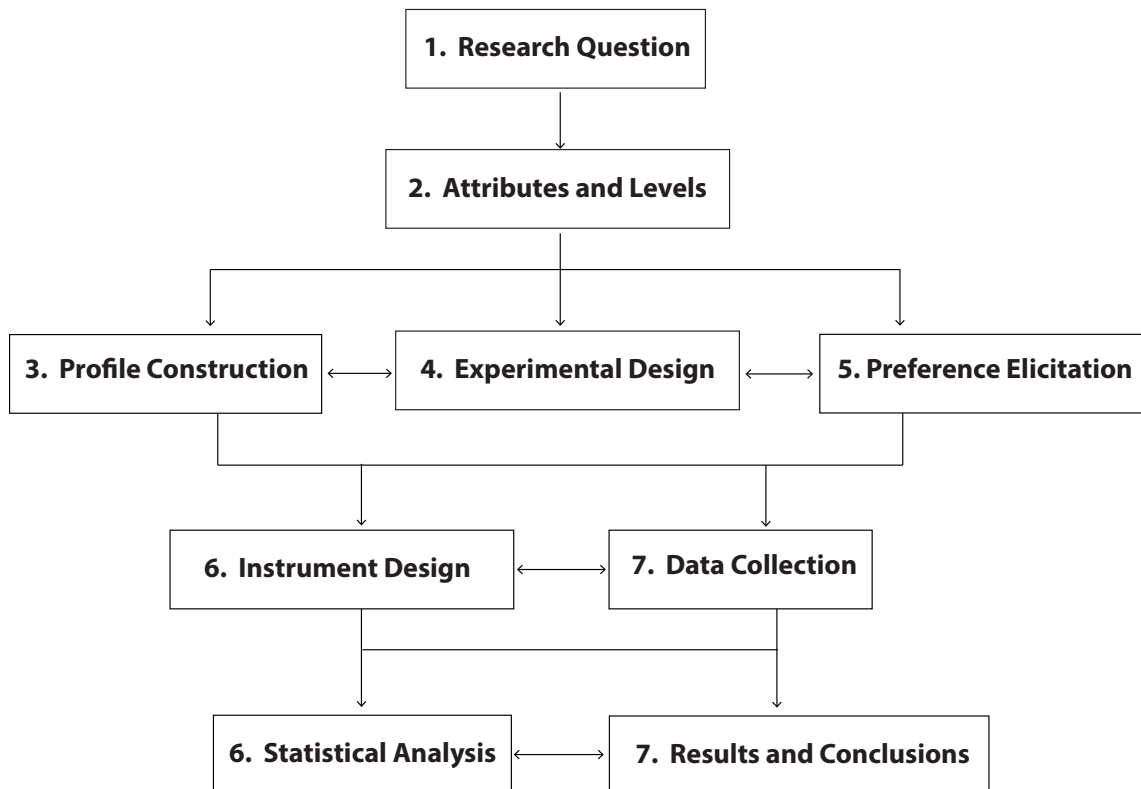
Undertaking a choice experiment is a cyclical process. The economic model underlying a CE is intrinsically linked to the statistical model: it conditions the design of the survey and the analysis of data (Hoyos, 2010).

2.2.3 Comparisons to Other Methods of Economic Valuation

In measuring the utility for a product or a public good, it is helpful to make a distinction between the revealed and the stated preference methods (see Figure 3). Revealed preference techniques use information from related markets to impute a value for non-market goods. Stated preference approaches are based on constructed or hypothetical markets where economic value is revealed through a hypothetical or constructed market based on questionnaires asking people what economic value they attach to goods and services. In other words controlled experiments evaluate hypothetical choices rather than actual choices in the market.

Stated preference methods were developed for valuing goods and services for which there are no observable market prices, for example environmental benefits. They are relevant for goods and services with multi-attributes where attributes are not priced separately as the attributes cannot be easily unbundled.

The choice modeling approach to valuation is considered as an alternative to the more familiar valuation techniques based on stated preferences such as the contingent valuation method (Hanley et al., 2001; Adamowicz et al., 1998).

Research on contingent valuation methods concentrates on estimating the total value of landscape resources such as forests, wetlands, and parks and has also applications for different scales.

Figure 3: Economic Valuation Methods

A choice experiment is a stated preference approach using hypothetical scenarios.
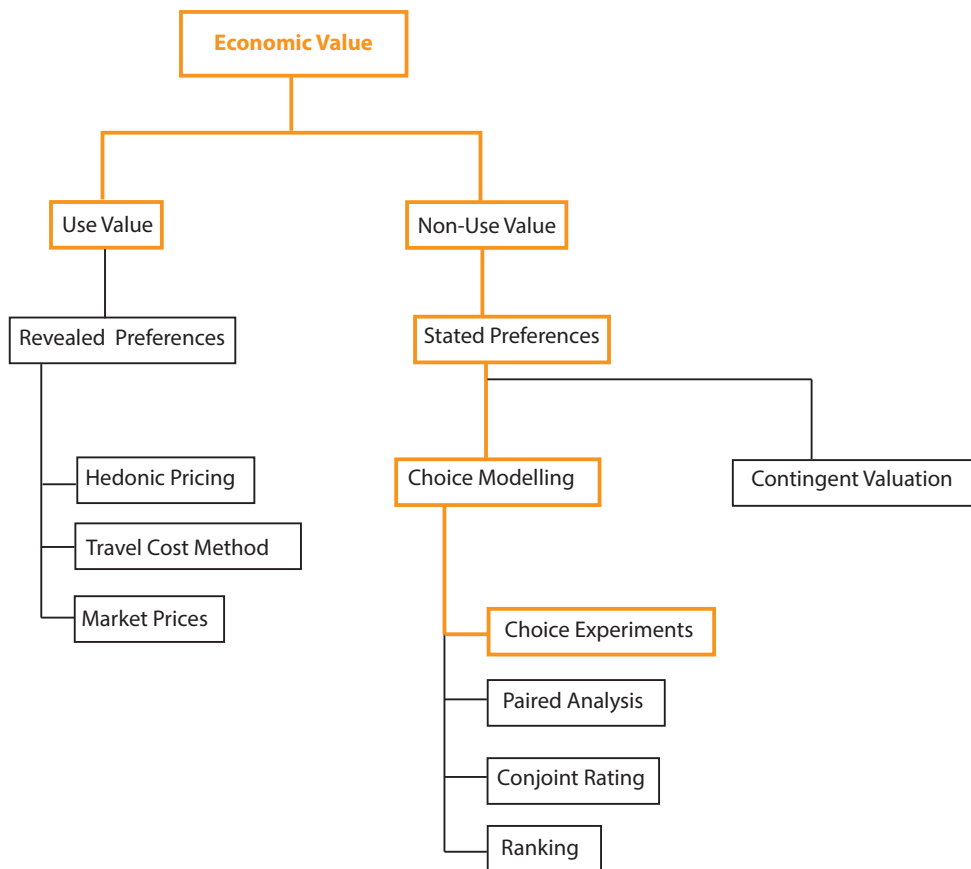
There have been various studies that have looked at landscape valuation using the contingent valuation method. Fukahori and Kubota (2003) assessed site design plans from both economic and psychological points of view using a contingent valuation method to analyze the relative importance of design elements such as vegetation, lighting columns, and pavements on the economic and perception-based values. Helfand et al. (2006) examined whether people are willing to pay more for more ecologically benign designs than for a lawn. Nordwall and Olofsen (2011) also took a quantitative approach for measuring architectural qualities of a housing estate in Sweden in monetary terms.

A discrete choice experiment is a sequence of multinomial choice questions characterized by two elements (Adamowicz et al., 1998). First, a respondent is asked to make a discrete choice between two or more discrete alternatives in a choice set; second, the alternatives in a choice set are constructed by means of an experimental design that varies one or more attributes within and/or between respondents in such a way that information related to preference parameters of an indirect utility function can be inferred (Carson & Louviere, 2011; Kuhfeld, 2010). The purpose behind conducting experiments is to determine the independent influence of different variables (attributes) on some observed outcomes. In stated choice (SC) studies this translates into determining the influence of attributes upon the choices made by sampled respondents undertaking the experiment.

There is some evidence that discrete choice experiments are better in estimation and provide a better understanding of the choices made by respondents than the contingent valuation method (Mogas et. al, 2006). The CE method goes beyond the traditional qualitative assessments and provides quantifiable data that can better guide the selection of the most appropriate strategies. Some stated preference methods require respondents to rank or rate alternatives according to their preferences. There are a number of disadvantages associated with the use of these methods as a means to obtain preference data including arbitrary choice of scale, respondent use of scale in a similar cognitive way, and the violation of the requirement that the dependent variable is continuous. Furthermore, ranking or rating alternatives according to one's preferences does not necessarily imply that this preference translates into a choice.   Choosing between alternatives overcomes this problem, and it addresses the criticism that there may be cognitive/perceptual differences between two respondents (Hensher et al., 2005). For example, if two respondents value an open space in the same way, this will be clear from their choice, whereas their rankings or ratings might be different. CEs provide extra information, providing evidence not just on what is important, but on the strength of preference for given design characteristics, trade-offs between these design attributes, and the probability of take-up of the specified attributes.

2.2.4   Significance to Landscape Architecture Design

Choice modeling has been used for transportation choices, environmental planning of forests and rural lands, land use choices and site selection. The attributes used in these studies include recreation type, land use, ecology and aesthetic value. Borresch et al. (2009) used the discrete choice method to determine what benefits there would be from a change from today's landscape dominated by intensive agricultural production towards a multifunctional landscape. This study used attributes such as plant biodiversity, water quality and landscape aesthetics. Windle and Rolfe (2004) employed choice modeling to investigate landholders' preference heterogeneity in willingness to accept direct monetary incentives for the rehabilitation/restoration of riparian buffers. Choice experiments have also been used to examine public preferences for specific landscape features. Rambonilaza and Dachary-Bernard (2007) used this method to obtain empirical evidence of the difference between the preferences of tourists and residents, for landscape attributes such as hedgerows, farm buildings and scrubland.

In the last decade, there have been a number of applications of this method in the design field although the application of CEs for design choices is less common. Alberini et al (2003) employed the choice method to determine whether people can value aesthetic and use services of a public square. Borgers and Vosters (2011) elicit consumer preferences and decision variables relevant in the first stages of developing a mega shopping center. Van Oel and van Den

Berkhof (2013) recently employed the method for eliciting preferences for aesthetic characteristics for an airport passenger area design. Hasan Basri (2011) valued attributes of Malaysian recreational parks using a choice experiment approach.

Evidence based design calls for increased rigor in the knowledge-based practice of creating the built environment. CEs are often the only option for gathering information on strength of preference, trade-offs and probability of take-up useful for both policy and design to prioritize needs and actions. Data sets on actual choices are often limited, either they don't exist or the information provided is incomplete. There appears to be limited research on landscape site design preferences using the CE method to date.

2.3   Design Process

In the development of a project, landscape architects employ a series of analytical and creative steps referred to as the "design process". There are many methods and strategies for approaching design with the application of these varying from one design situation to the next. The choice of design methodology and process values is flexible and can vary depending on the designer and context. The design process can combine knowledge and intuition in a way that translates complex information into coherent designs (Stokman & v. Haaren, 2012). One approach is to emphasize the subjective creative dimension (Swaffield, 2002). Others are more akin to landscape planning where

a structured approach on understanding the individual biophysical layers of the landscape (McHarg, 1967) is emphasized.

The purpose of the design process include: providing a logical, organized framework for creating a design solution; helping to insure that the solution that evolves is appropriately suited to the circumstances of the design; aiding in determining the best use of the land for the client by studying alternative solutions; and serving as a basis for explaining and defending the design solution to the client (Booth 1989).   Once the program and the site's context are well understood multiple concept plans should be developed before proceeding to more detailed design (LaGro 2011).

A typical design process includes steps shown in Figure 4 from predesign through to construction.   The design process is usually iterative or occasionally linear, or may oscillate between the two.

Figure 4: Typical Design Process

Key stages in a design project. This choice experiment impacts those stages identified by an orange circle.
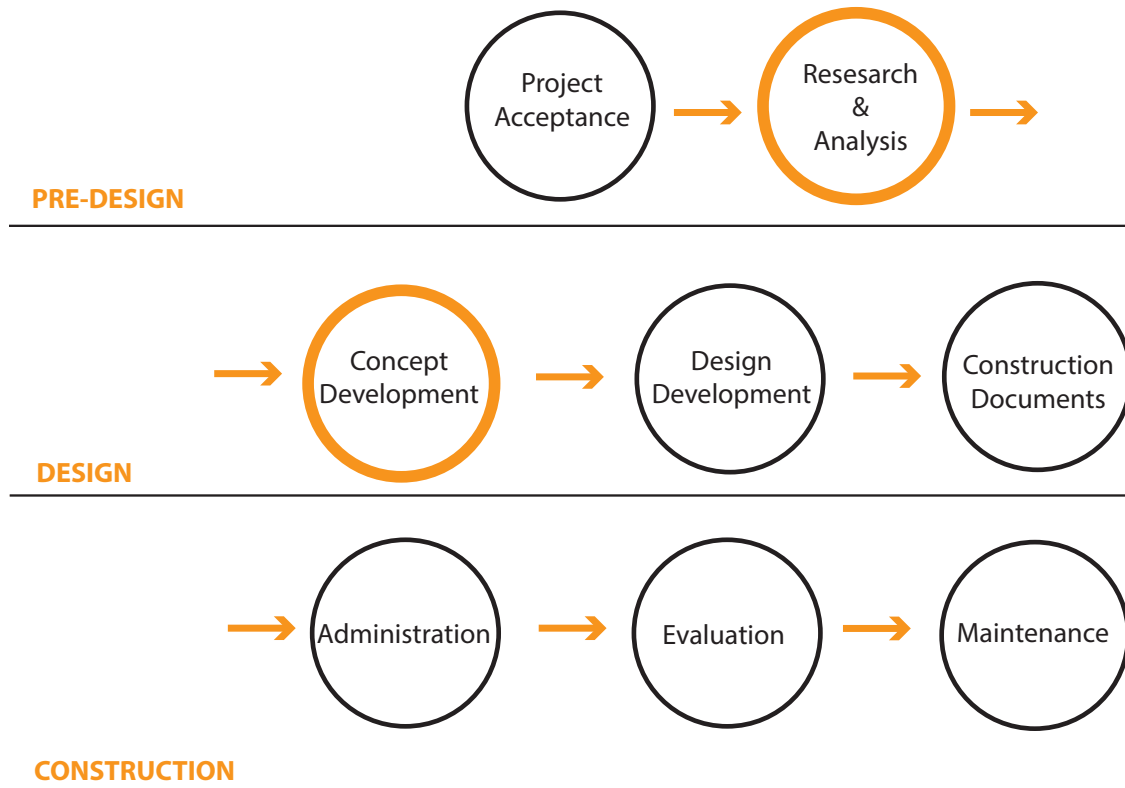
2.3.1   Choice Experiments and the Design Process

There are many opportunities for public participation during the design process.

Public participation is most effective if it occurs early and often. The choice

experiment (CE) provides the public one opportunity to guide the design project.

The CE in this study was conducted during the pre-design phase of the project.

While it depends on the objectives of the study, the most useful stage to conduct

a CE is likely to be during the pre-design stage of a project in the research and

analysis phase.

Figure 5: Design process components

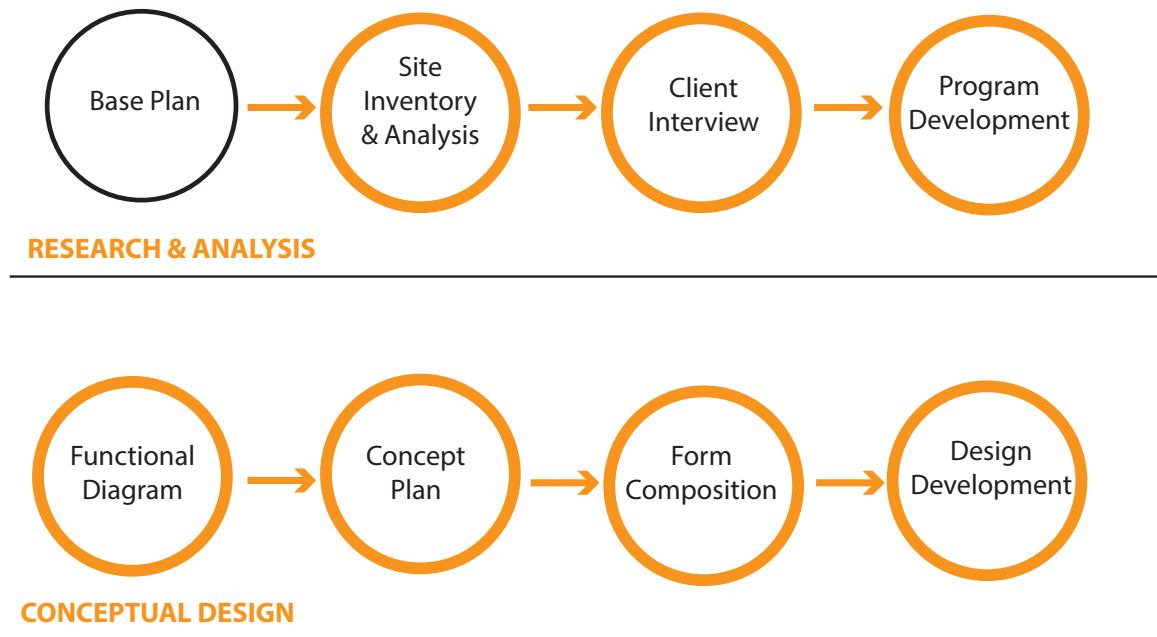Key stages in the design process. This choice experiment impacts those stages identified by an orange circle.

The economic model in a CE describing the issue under analysis is revised as new information is gathered from the experimental design, experts' advice, focus groups and pilot surveys. Information can also be gathered from several phases in the design process (Figure 5). The definition of the characteristics to be examined by a CE can be informed by information gained throughout the design phases and conversely the outcomes of the experiment will provide further information that is typically sought from the site inventory analysis component, client interviews and program development. It is also likely that some site analysis and broad concept development must take place before conducting the choice experiment in order to help determine the attributes for inclusion, keep the

experiment site context specific and to assist in producing realistic graphics showing each hypothetical open space.

2.3.2   Expected Outcome

CEs are a proven strategy in other disciplines for engaging the public and eliciting preference information. They are a credible approach to elicit preference information to predict the outcome of design decisions by creating a clear statistical relationship between design decisions and utility levels.

It is expected that by applying the CE methodology, those characteristics of open space design that are significant to the public will be identified and the probability of selecting an open space design will depend on the characteristics in predictable ways.

Choice experiments have the potential to build landscape design evidence as a directive for design ultimately leading to a better design outcome with greater confidence that the open space will be used and enjoyed.

3 The Experiment

This choice experiment study elicits the public's preferences about design characteristics relating to the development of a surface parking lot into a public open space.

3.1 Context

A site in downtown Baltimore was used for the study. The site (see Figure 6) is a small city block on the eastern edge of the downtown area. It is currently utilized as a user pays surface parking lot (Figure 7) with spaces for approximately 187 cars.

Figure 6: Study Site
The site in downtown Baltimore is currently used as a surface parking lot.
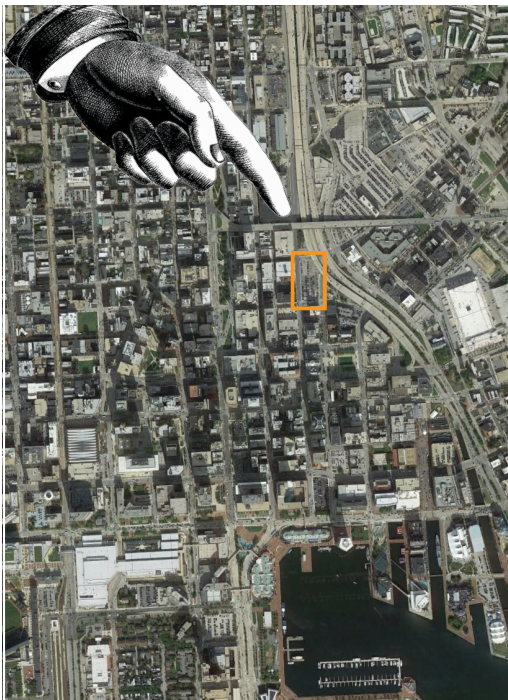
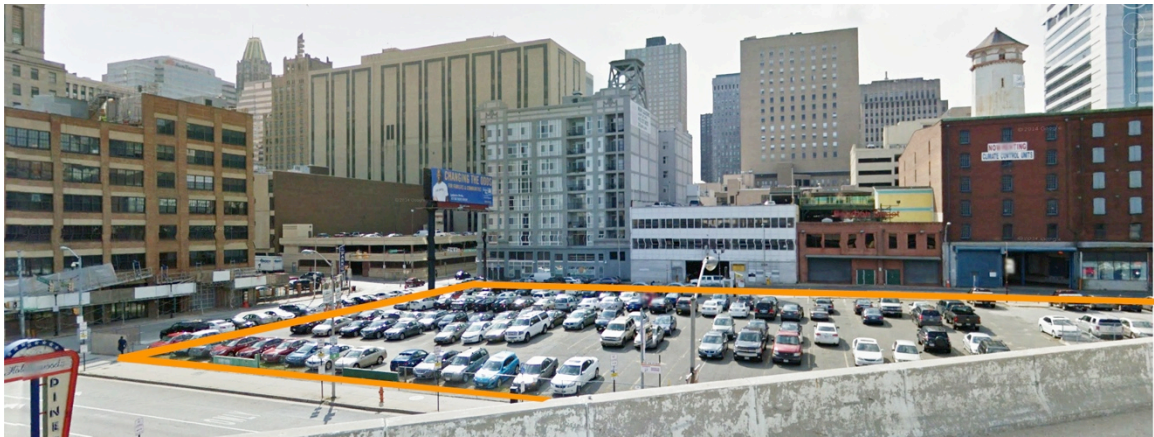The rectangular parking lot is bound by buildings on the south and western sides with the north and east boundary formed by Interstate 83 known as the Jones Falls Expressway (JFX).   Section 4.1 of this document contains more information about the site.

Figure 7: View of site from JFX
A view of the study site from the elevated Jones Falls Expressway.

The site was primarily selected for to its proximity to the Baltimore Farmers' Market from which a sample population could be drawn (Figure 8). Approximately 7,553 patrons visit the Farmers' Market each market day (SEED, 2011).

Furthermore, the site is a good cognitive shape and size. This was a considered valuable quality to assist the public in imagining what a potential park development could look like on the site.

Figure 8: Farmers' Market (Better Cities, March 2013)

Images showing the parking lot (bottom left) activated by a farmers' market on Sunday mornings.
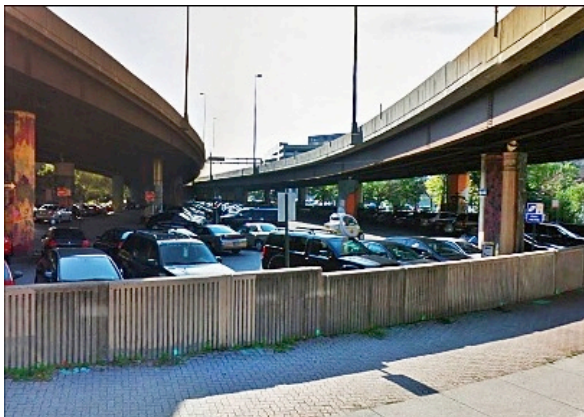
3.2   Attributes for the Choice Experiments

Once the research question is clearly defined, the next stage in conducting a CE is to determine those characteristics or attributes and their levels for inclusion in the experimental design. The research question for this study is "What design characteristics are significant to the public in the development of an urban open space?" Relevant attributes and levels for this experiment were open space characteristics that are significant to the public that may have an impact on utility and demand.

The initial identification of the design characteristics (attributes) was informed by landscape architecture and urban design projects, literature and the researchers' own ideas.   Journals, city planning documents, landscape architecture textbooks and other design documentation were reviewed to identify attributes that are important to the public but also pertinent to the designer. Urban open space design precedents were also a useful source. In addition, other stated preference studies were explored for relevant attributes.

The initial list of attributes to include in the study is shown in Table 1.

Table 1: List of Candidate Attributes

Design characteristics (attributes) and levels considered for inclusion in the choice experiment.

Attribute	Description	Levels
Identity	Refers to the uniqueness of the site or its local identity.	Global Baltimore identity National identity
Design style	Refers to the aesthetic style of an open space.	Contemporary Modern Traditional Naturalistic
Use/function	Refers to an open space use for the parking lot other than for parking cars. For example: active recreation, market plaza, wildlife habitat.	Active recreation Passive recreation Production Ecological services
Surface type	Refers to what material the ground plane is made up of. For example: gardens, lawn, courts, paved.	Paved Vegetated Mixture
Ecological integration	Refers to the integration of ecological processes within the site design.	Focus of the design Incorporated Not incorporated
Plant materials	Refers to the use of native and non-native plants.	Native Exotic Mixed
Geometry	Refers to the shapes and form used the layout	Organic Rectilinear
Topography	Refers to the variation in level changes of the site	Flat site Varied topography
Spatiality	Refers to the delineation of the space.	Sense of enclosure Open permeable site
Amenities	Refers to the inclusion of site amenities such seating, lighting, equipment, security, water features, signage and structures.	Few Many

If all these attributes were included in the experiment, it would have resulted in a very large and complex design. Adding to the complexity, the attributes are defined by different dimensions or levels.

As this was a first attempt at a choice experiment by the researcher, the intention was to keep the choice experiment design simple by limiting the number of attributes and attribute levels as described in the section below. Complexity of the design, cognitive challenge, respondent burden and requirement for image generation were all factors in this strategy.

3.2.1   Focus Groups and Interviews

Focus group exercises and interviews were held to help to determine which attributes to include in the study. The main objective of these exercises was to reduce the number of attributes by identifying those that were most relevant to the public and also those more suited to the realm of the designer. Other objectives included clarifying attributes definitions, determining attribute levels and identifying graphic content.

The first exercise engaged 10 experts of planners, designers and graduate design students. Each expert was given the initial list of attributes shown in Table 1. Each identified five attributes that they thought would be the most useful in gaining insight into the public's preferences over and above information they could gather from other sources. This group was also given the opportunity

to identify other attributes and levels that were not included in the initial list. The experts were then interviewed to find out the rationale behind their choices.

Another session asked a group of eight members of the public to examine and describe park images. The purpose of this exercise was to identify what aspects of the parks that they deemed important. The exercises with the public also helped to determine the most appropriate language and effective graphic technique to use. This session took three hours.

3.2.2   Final Attribute Selection

Ultimately the study adopted only five attributes: four broad design attributes and one cost attribute. The attributes are shown in Table 2. While more attributes and levels may provide a better understanding of the relationship between an attribute and the respondent's utility there was a trade-off between the number of attribute levels and complexity of the experimental design of this study. Furthermore, the sample size requirement increases with more attributes and levels. This was only an exploratory study with limited resources.

The levels of the design attributes can be considered extreme. For example, the "Surface" attribute is either primarily paved or primarily vegetated. Additional levels could have been included showing other combinations such as 50% paved, 50% vegetated for example. Extreme level designs are known as end-point designs and are particularly useful when a linear relationship may exist

amongst the part-worth utilities or if the experiment as an exploratory tool as is the case with this study.   However, in order to provide realistic examples of useable spaces, the attribute level range is less extreme than could be possible.

Table 2: Choice Experiment Attributes and Levels

Design characteristics and the levels as applied in the hypothetical open spaces in the choice experiment. The attributes that were initially considered but ultimately excluded are listed in Appendix One including the reason for their exclusion.

Attribute	Description	Levels
Use	Refers to what type of recreation the open space will be used for.	1. Primarily Active 2. Primarily Passive
Surface	Refers to what material the ground plane is made up of.	1. Primarily Green 2. Primarily Paved
Shape	Refers to the shapes and forms used in the design, particularly at the ground plane.	1. Curvilinear 2. Rectilinear
Space	Refers to the delineation of the space.	1. One main flexible space. 2. Many defined spaces.
Cost	Refers to the willingness to pay based on a one-time tax charge.	1. $10.00 2. $15.00 3. $20.00 4. $25.00

It is reasonable to expect that a "green" open space also include paved paths and that a paved space such as a plaza would include some type of vegetation. In the case of the "Use" attribute, an open space that is used for active recreation

such as sport activities typically also includes seating and resting areas hence the level extreme was scaled back to "primarily active" and "primarily passive reflecting that in reality open spaces are multi-functional.

In addition to the focus group exercises, open spaces in close proximity to the study site were categorized using the selected attributes to validate that the chosen attributes and levels reflected open space characteristics (Figure 9). It was found that the attributes of the choice experiment did describe realistic scenarios.

Figure 9: Open Spaces and their characteristics in Downtown Baltimore
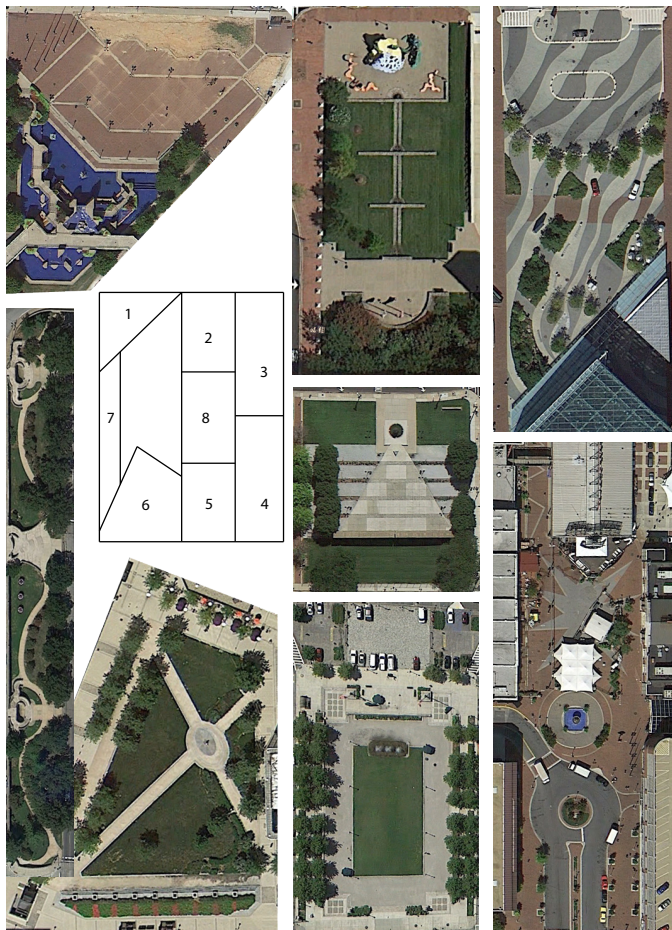
#	Name	Use	Surface	Shape	Space
1	McKeldin Plaza (Inner Harbor)	Mainly Passive	Mainly Paved	Rectilinear	One main space
2	Hopkins Plaza (Downtown West)	Mainly Passive	Mainly Green	Rectilinear	Many spaces
3	Weinberg Plaza (Aquarium)	Mainly Active	Mainly Paved	Curvilinear	Many spaces
4	Powerplant (Downtown)	Mainly Active	Mainly Paved	Mixed	One main space
5	War Memorial Plaza (City Hall)	Mainly Passive	Mainly Green	Rectilinear	One main space
6	Charles Center (Downtown Central)	Mainly Passive	Mainly Green	Rectilinear	One main space
7	Preston Gardens (Downtown East)	Mainly Passive	Mainly Green	Curvilinear	Many spaces
8	Holocaust Memorial (Downtown East)	Mainly Passive	Mainly Green	Rectilinear	One main space

3.3   Experimental Design

For any choice experiment (CE) study there exist many experimental designs that could possibly be constructed. A full factorial design combines every level of each attribute with every level of all other attributes. Each combination of the attribute levels is called a profile or alternative. In this study there are four attributes each with two levels and one attribute with four levels. There are therefore 64 possible hypothetical open space profiles (alternatives) for this open space study, ie. $(2^4 \times 4^1)$.   Requiring respondents to compare two or more alternatives simultaneously further complicates the design of a choice experiment. There are 2016 possible pairwise choices, ie. $((64*63)/2)$.

The number of profiles and groups of alternatives had to be reduced to lower the cognitive burden faced by respondents and lower the requirement for image generation and sample size. Keeping the design simple was a deliberate decision to facilitate this process. Further research could expand the experiment.

There are many strategies to generate experimental designs addressed by several authors Kuhlfied, Tobals, and Garratt (1994); Lazari and Anderson (1994); Zwerina et al (1996); Sandor and Wedel (2001); Kanninen (2002); Rose and Bleimer (2004) for example. The design determines both the types of effects that can be identified in the data and the interpretation of those effects. This study was primarily interested on identifying the main effects.

After some trial and error with different methods of experimental design, a SAS algorithm that optimized the number of pairs using an efficient fractional factorial model was used (Kuhfeld, 2010).[1] The decision to use the statistical software package SAS was primarily due to expediency and some familiarity with the software.

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[1] The %mktex macro showed that an efficient design was possible with the smallest design size of 8 choice sets each with two alternatives with a relative D-efficiency of 82.03. The %choiceeff macro determined a generic design with eight choice sets each consisting of two alternatives. From the candidate set of alternatives, the %mktdups macro determined the best design with standardized orthogonal coding.

The smallest generic design possible as determined by SAS was eight choice

sets each consisting of two alternatives.   Many researchers use no more than 8

or sometimes 16 choice sets (Champ et al., 2003), with Chung et al. (2011)

recommending only six choice sets. In order to reduce the sample size

requirement, the number of choice sets each respondent was presented with was

eight. With eight discrete choice sets only one version of the questionnaire was

possible and blocking was not necessary[2].

The SAS design considered level balance, minimum overlap and orthogonally.

All levels of each attribute appeared with equal frequency across profiles. For

the two level attributes, each level appeared in 50% of the profiles. For the four-

level attribute each level appeared in 25% of the profiles. There was no

repetition of an attribute level within a choice set.   This ensured that the

experiment drew out the maximum information from respondents regarding

trade-offs.

This was an unlabeled experiment meaning that each alternative was generic or

uninformative to the respondent. The choice sets were presented in a generic

Option A, B, or C form rather than an alternative-specific form such as a plaza,

sports field, or parking lot for example. I presented an unlabeled experiment in

the hope that the respondent would focus more on the attributes and not be

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[2] Blocking refers to independent subsets of the overall design. For example, 2 blocks of 4 choice

sets each.

influenced by the specific type of space with the only way of differentiating between each alternative being via the attributes, attribute level labels and the images.

In the design of a choice experiment, a common recommendation (Louviere, Hensher, and Swait, 2000) is to mimic an actual market situation by including a constant opt-out or status quo option. If an opt-out alternative is not presented, the choice provides information on preferences, conditional on choosing one of the alternatives, but it does not provide information on whether the individual would choose one of the alternatives or not. A status quo option was therefore included as an alternative in each choice set as Option C. This option represented the existing surface parking lot. The surface parking lot is a source of utility for those who park there. If the status quo was not included and respondents preferred the parking lot to remain, then the model would not present an accurate estimate of welfare.

3.3.1   Profile Generation

Typically each profile in a choice set includes attribute level labels, graphics, or both. Strategies of using symbols, graphics or pictures for each attribute can also be employed.

To assist respondents answering the choice experiment (CE) questions, each bundle of profile attributes in this choice experiment was presented as a single

photorealistic image as shown in Figure 10.   There were eight choice sets in the experiment and therefore 16 hypothetical open space images in total.

Initially, images of existing parks for each profile image were used as precedents are commonly used in landscape architecture. However during the focus group interviews it was quickly identified that this approach resulted in too much variation in style, function and scale leading to subjectivity, taste differences and bias.

Figure 10: Choice Profile Example
An example of a choice profile based on one set of attributes and levels.
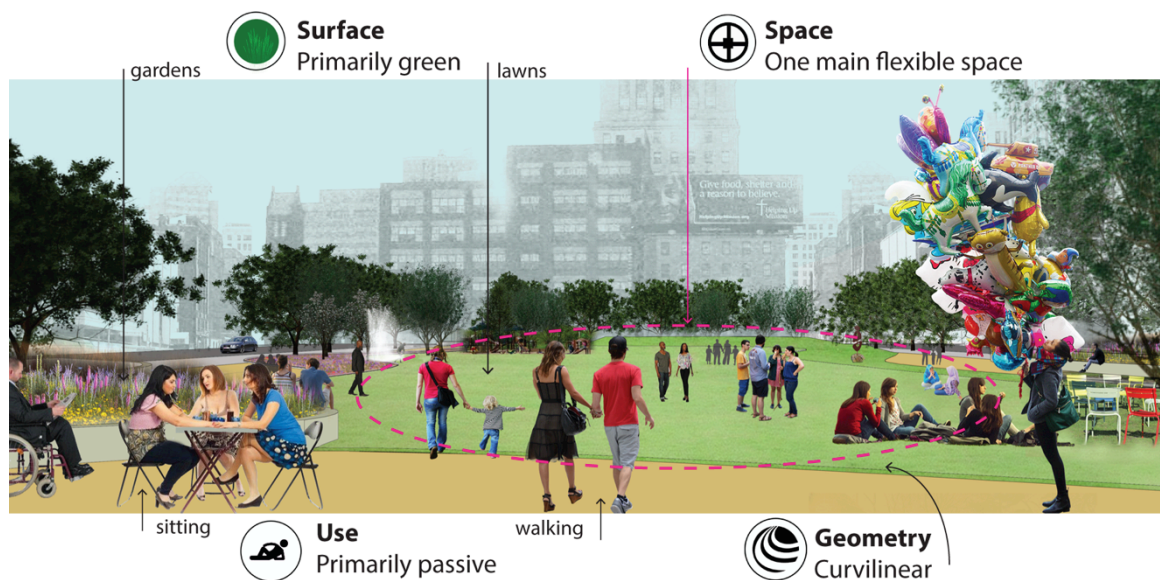
The focus group discussions also identified that the perspective drawing was the most appropriate drawing type to use for public comprehension. Other architectural drawing views such as site plan and birds' eye perspective did not

visually explain the space adequately for those members of the public in the

focus group who were not familiar with architectural drawings.

Another important point raised during the focus group sessions was the need to

show the space being occupied by people.   Many precedent park image

examples have a lack of people using the space and can be perceived

undesirable. By including a similar numbers and people in all profiles the

intention was to show each space equally utilized.

3.4   Questionnaire Design

Once the eight choice sets were generated, a questionnaire was constructed to

collect the choice data, a sample strategy devised and the survey implemented.

Constructing a choice survey is similar to constructing a more conventional

survey with the additional complexity of including the choice set questions. The

questionnaire (see Appendix 2) follows the typical structure for a stated

preference survey and consists of four sections. The first section contains

introductory questions focusing on open space use, attitudes and tastes of the

respondents which also serve as warm up questions; the second section

contains the choice experiment questions; the third asks for information about the

respondent; and the final part of the survey is concerned with respondents

comprehension of the survey. The questionnaire was built in the online survey

software program Qualtrics.

3.4.1   Choice Questions

Section Two of the questionnaire contains the choice questions or choice sets. Respondents were first presented with information about the attributes. The respondents had the opportunity to view additional fact-sheets describing the attributes (Appendix 3) and were also able to ask the interviewer for further explanation.

Each respondent was required to answer eight choice set questions in the survey. As described previously, each choice set or question contained three alternatives as shown in Figure 11. Two alternatives were landscape developments of a public open space with the third alternative being the status quo alternative in which there would be no improvements to the parking lot, at no cost.

Figure 11: Choice Question

One of the choice questions from the questionnaire. Appendix 2 includes the other seven choice questions.

Which option would you choose?

Option A	Option B	Option C
Use — Primarily active Surface — Primarily paved Complexity — One main space Geometry — Curvilinear Cost — $25 one off tax	Use — Primarily passive Surface — Primarily green Complexity — Many defined spaces Geometry — Rectilinear Cost — $15 one off tax	Cost — No Additional Cost
☐	☐	☐

3.4.2 Pilot Survey

Prior to implementing the final survey, several small pilots were undertaken to test the Qualtrics interface, to determine whether respondents adequately understood the purpose of the study, the definitions of attributes and levels and whether they could cope with the number of choice sets and survey length. While the pilots were useful for rapid appraisal, they were not of sufficient sample size to do any analysis on the data.

Fifteen farmers market patrons self-administered the survey on-line. Changes to the questionnaire included reformatting the choice set questions so the image did not dominate the written description and presentation was changed to a horizontal format to assist with comparison between options. The survey was also altered to include some warm up questions.

The respondents took on average 9.5 minutes to complete the questionnaire, which was considered acceptable by the researcher.

3.4.3 Sampling Strategy

Responses were elicited from the patrons of the Baltimore Farmers' Market immediately adjacent to the study site. The study site in downtown Baltimore was selected for its relative ease of comprehension and its access to survey respondents who frequent the area whom may be willing to participate in the study. By undertaking the survey on-site it was expected that the respondents would have

a good understanding of the site and its context.   For a more in-depth and rigorous study the target population for the study could have been from the larger population of downtown residents and visitors.   As this study is essentially a rapid appraisal of the methodology a specific population was targeted.

Data were collected online with tablets during September and October 2014 at the study site. A booth with 2 tablets, Internet access and an interviewer was present during operating hours of the Baltimore Farmers' Market which is held only on Sunday mornings only. Patrons of the Farmers' Market who passed by the booth (see Figure 12) were randomly selected to participate in the survey. Those patrons who approached the booth independently were also able to participate. There was no planned stratified sample. There were approximately 200 people each hour passing the space allocated to conduct the survey. The expectation was that 1%, or approximately 20 respondents each market day, would complete the questionnaire.

An introduction to the survey was verbally given. The first screen of the survey also included information on the purpose of the study, why the respondent was asked to participate and how the results would be used. No incentives were offered.   The majority of the respondents indicated that the survey was easy to understand and not too long. The average time to complete the questionnaire was 8 minutes. All the respondents were familiar with tablet technology.

Figure 12: Survey Booth

The sampling strategy was adequate during favorable weather conditions. The

change in weather conditions from hot sunny days to cold and windy days had a

dramatic impact on the number of respondents willing to participate. I had expected

to get over 100 respondents using this strategy, but ultimately settled for 60.

Only one respondent failed to complete the questionnaire, resulting in 59 usable

surveys.

3.5 Results

3.5.1 Characteristics of the Sample

Characteristics of the survey respondents are shown in Table 3.

Half of the respondents were Baltimore City residents, with another 45% of respondents from the Baltimore Metropolitan Area. The remaining respondents were predominantly from the State of Maryland.

Respondents were predominantly of Caucasian race, highly educated, employed and owned their own home. Thirty nine percent of the respondents were male. The majority of respondents were between the ages of 25 years and 54 years. Forty one percent had children under 18 years old living in their household.

It should be noted that the sample from the Baltimore Farmers' Market does not represent the Baltimore City population nor the Downtown/Seton Hill district that the Farmers' Market is located in. The sample characteristics are therefore not consistent with the census data of these areas. The characteristics of the respondents are likely a better reflection of the Farmers' Market patrons. There was no detailed data available to confirm this however.

Table 3: Respondent Characteristics

Variable	Total	Downtown[3]	Baltimore City[4]
Number of Respondents	59	6,446	620,961
City Resident	47%		
Male	39%	49%	47%
Race - White	85%	39%	28%
Race – Black	7%	37%	64%
Race - Other	9%	24%	8%
Age - 19-24	8%	21%	13%
Age 25-54	83%	68%	54%
Age 55 and over	9%	4%	12%
Bachelors Degree or above	83%	65%	26%
Annual income above $40,000	83%	21%	13%
Unemployed	7%	3%	10%
Home ownership	75%	43%	60%
Household size	3	1.6	2.4
Household with children, 18 and younger	41%	9%	28%

[3] 2010 Census data

[4] 2010 Census data

Section One of the questionnaire included questions on interests, attitudes and sustainable design knowledge. Seventy five percent of the survey respondents frequently engage in outdoor physical activity. Seventy one percent garden at least occasionally. About half of the respondents frequent farmers markets and city parks on a regular basis.   Just under a third had expertise knowledge on sustainable design practices. See Appendix 3 for data tables.

Of those surveyed, just over half considered community to be the most important factor in an open space development. Thirty two percent placed higher value on the environment, with only 12% considering aesthetics to be the most important factor. Approximately half of the respondents indicated that a lack of well-equipped parks in the city was of greatest concern to them. A large portion (44%) of the respondents wanted to see more community gardens and parks and gardens in the city. Crime was considered the biggest concern about city spaces by 39% of respondents.

Just over a third of respondents indicated that they would visit the open space at least once a week with a further 22% visiting only when the Farmers Market was operating.

3.5.2   The Model

Data were provided on 472 choices from 59 respondents.   The model is based on the entire data set with all eight choice questions included. The questionnaire was designed to force responses to the majority of the questions with all of the choice questions requiring a response.   There appeared to be no respondents who selected either all Option A, all Option B or all Option C for all 8 choice questions. No irrationality tests were undertaken.

The four design attributes were effects coded[5]. The excluded level (base level) was negative coded in each case. Cost was coded as a numerical value with four levels.   The status quo option is considered a baseline profile and was therefore coded with all attributes being zero. The inclusion of a status-quo option was necessary to capture the utility of this option as it has no attributes.

The alternative specific constant (ASC) which represents a "development scenario" is not choice specific but equals 1 when either Option A or B was chosen and equals 0 when the "status quo" existing parking lot was chosen.

The dependent variable "choice" was a discrete variable that equaled 1 for the option chosen and 0 if not chosen.

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[5] Effects coding is similar to dummy coding of nominal and ordinal variables, but avoids confounding between the base level and overall grand mean (Hensher et al., 2005).

3.5.3   Conditional Logit Model

In order to determine the significance of the design attributes to the public, an econometric analysis of the choice experiment data was undertaken in the statistical software package STATA 13.1. The conditional logistic regression model (clogit) was used to investigate the relationship between the choice of an open space and the attributes.

Both multinomial logit (MNL) and conditional logit (CL) can be used to analyze the choice of an individual among a set of two or more alternatives. The MNL focuses on the individual as the unit of analysis and uses the individual's characteristics as explanatory variables. In contrast the CL focuses on the set of alternatives for each individual and the explanatory variables are characteristic of those alternatives.

The attributes of the alternatives were of primary interest in explaining choice. The data was therefore fit to the conditional logit model. The conditional logit model measures preference according to McFadden's random utility maximisation (RUM) framework (Champ et al., 2003).   The conditional logit model assumes that the marginal utilities of the attributes are fixed and identical for all individuals. Variation in taste among individuals requires a more complex variant of the model that allows the coefficients to be random variables and to vary over the population.

The estimated CL model is shown in Table 4. The model assumes that the respondents make choices from the alternatives that maximize their perceived utility. The sample includes all respondents. The coefficients show how

respondents rated the relative importance of each attribute. A significant positive coefficient indicates a greater probability of a respondent choosing an option with this attribute level relative to the status quo.   In Table 4, the importance of the selected attributes in choosing the open space that was most attractive to them is shown as the estimated utility of all attributes. Different marginal utilities are assigned for use, shape, surface and space. Cost was not statistically significant however.

The large positive and significant ASC value indicates a strong preference toward the development of the parking lot into an open space as opposed to keeping it as a surface parking lot. Respondents' least attractive option was the parking lot alternative, with only a 3% choice rate. In the majority of cases, respondents made a choice between one of the two hypothetical park options presented in the choice sets. Economic theory suggests that the sign of the coefficient on cost should be negative. The sign of the coefficients for the use, space, and surface attributes is not guided by economic theory and there were no strong *a priori* expectations.

Table 4: Preference Estimates for the Attributes

Attribute	Reference Level	Coefficient	z test	95% Confidence Interval
ASC (open space development)	Status quo – parking lot	2.86*	9.17	[2.24, 3.48]
Use (primarily passive)	Primarily active	-0.17*	-3.18	[-0.28, -0.0.7]
Surface (primarily green)	Primarily paved	0.34*	6.56	[0.24, 0.44]
Shape (curvilinear)	Rectilinear	0.10*	2.02	[0.01, 0.20]

Space (many)	One many space	0.15*	2.94	[0.05, 0.25]
Cost		-0.06	-0.93	[0.18, 0.06]

* significance at 5% level

Log-L	-347.22
Adj-Pseudo R2	0.33
LR chi^2 (6)	342.64
Prob>chi	0.0000
N (choices)	1416
N (groups)	472

Overall the model is significant.   The conditional logit model performs relative well, shown by an r2 value is equal to 0.3304. The log-likelihood test revealed that attributes have a significant impact on choosing an option.

Figure 13 shows the design characteristics ordered from most influential to the least influential. "Surface" is considered the most important attribute (0.34), followed by "Use" (0.17) and "Space" (0.15). "Shape" is the least important attribute (0.10). Based on the results, respondents tended to prefer a design that was primarily green, primarily active, curvilinear and consisting of many spaces within the park.

Figure 13: Preferences for Design Attributes

Preferences of design attributes
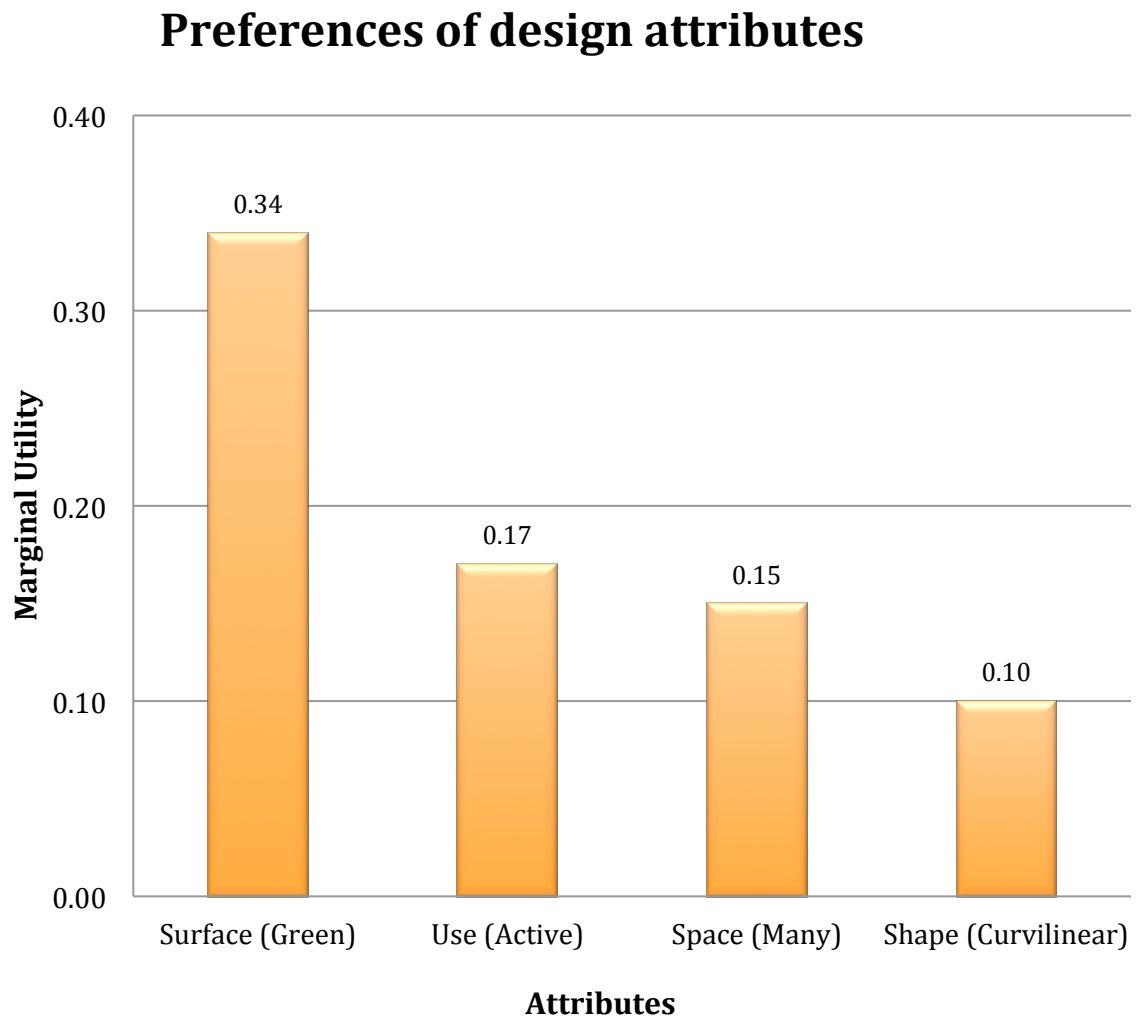
Figure 14 shows the most preferred design of an open space and Figure 15 shows the least preferred open space. Even the open space design in Figure 15 is preferred over retaining the parking lot.

Figure 14: Open space profile consisting of the most preferred attributes

Figure 15: Open space profile consisting of the most preferred attributes

The current site conditions are clearly unappealing to respondents. Even though the site has value as a parking lot, the majority of the respondents do not use the parking lot. Adjustment to pricing levels and adjusting the sample strategy may see a greater value placed on retaining the parking lot.   In a future study, the population should be expanded to include users of the parking lot.

Respondents prefer development alternatives for the surface parking lot that are "Primarily Green". This is shown by the positive coefficient of 0.33 for Surface with the base level "Primarily Paved".

The base level for "Use" is "Primarily Passive". The coefficient for "Use" is negative and so implies that individuals prefer that the development have "Primarily Active" recreation opportunities. The effect is strong with the associated coefficient is 0.173.

3.6   Discussion

The massive expanse of paved surfaces, large concrete structures and distinct lack of greenery surrounding the study site may help to explain the preference for a "green" open space. Surface parking lots, transportation networks and large institutions characterize the eastern side of downtown Baltimore. The dominance of the traffic networks and surface parking lots is shown in Figure 16.

A considerable amount of literature exists that links green spaces with better mental and physical health: McConnell and Walls (2005), Gies (2007), Tzoulas et. al., (2007) for example. It is often said that city parks and open space improve our physical and psychological health, strengthen our communities, and make our cities and neighborhoods more attractive places to live and work.

The survey sample was drawn from Farmers' Market patrons and so there is potential for bias toward favoring a primarily green space. The respondents were

active, health conscious (bought food from farmers market) and highly educated. Table 3 compares the respondent population with the population of the downtown area and Baltimore City. It was expected, however, that there would have been some preference toward a paved space that facilitated the continued use of the site for the market.

Figure 16: Eastern edge of downtown Baltimore

The choice toward green space may also be symptomatic of the lack of usable green spaces within the downtown area. The land use diagram in Appendix 6 shows the green spaces in close proximity to the site. Green spaces of note near

the park include the Diner Park, Preston Gardens, Memorial Plaza, Mt Vernon and the Holocaust Memorial. These are all passive spaces and are flagged for renovation in the Baltimore City Open Space Plan (2010).

The choice of a "primarily active" open space comes as no surprise for a few reasons. The respondent sample values health as indicated by their enjoyment of outdoor physical activity and their consumption of Farmers' Market food. According to a comprehensive 1996 report by the U.S. Surgeon physical activity makes people healthier (CDC, 1996). Furthermore, it is highly unlikely that the site could be developed into a calm oasis due to the challenges of the road network and safety concerns of the area.

The few existing green open spaces in close proximity to the site are geared toward passive recreation. The choice experiment (CE) therefore indicated a preference for a different type of space where there is some form of active recreation. In other words the open space is somewhere when you come to do something.

Respondents are less concerned with the design language of the park but still show a preference towards designs that are made up of many areas within the larger space and tend to prefer curvilinear shapes to a rectilinear layout.

The space attribute is concerned with the preferred arrangement of space. Geometry and composition are key elements of design. Spatial configuration not only contributes to aesthetics, but also contributes to achieving other needs.

Thwaites et al. (2005) propose the possibility that certain spatial arrangements may be beneficial to human well being socially and psychologically.   Geometrical systems are amenable to scale independence, the nesting of components within one another, and the sequential experience of change through movement and vision. This notion is consistent with the tendency for a preference of many spaces within the park.

The shape attribute was the least important design attribute in influencing choice. There have been a number of studies that have demonstrated that contour motivates aesthetic judgments however.   Curvilinear forms are experienced as softer and more pleasant, whereas angular forms are experienced as harder and more serious.   More recently, in a study of contour and aesthetic judgment in architecture decision-making, Vartanian et al. (2013) found that the combination of our behavioral and neural evidence underscores the role of emotion in our preference for curvilinear objects. This is consistent with the public's preference for curvilinear geometry.

The coefficient of cost is negative, as predicted by economic theory. The expected *a priori* sign for "Cost" in a conditional logit model is usually negative, where the individual has to pay or trade money for an increase in the attribute levels indicating that people prefer to pay a lower price or less tax. Price however was not statistically significant in this study indicating that either the pricing strategy was poor or cost was not an important driving factor for choice if the public considers urban open spaces an essential component of everyday life in Baltimore.

According to the Trust for Public Land (2006)the public wants more parks and repeatedly show their willingness to raise their own taxes to pay for new or improved parks.

The true effect on welfare of the site's development cannot be measured by the amount of money households are willing to pay for a change to develop a public open space in this study. Further analysis of cost levels should be undertaken to determine whether these were set too low and the range too narrow.

Including a parking lot alternative that includes ecological aspects could also be investigated.

3.6.1   Interactions

All respondents will not necessarily be homogenous within a random sample. The value or importance that respondents place on each aspect of the design conditions can vary. It is likely that tastes and socio-economic factors will cause differences between respondents creating divergence in preferences.   This preference heterogeneity can often be explained by including socioeconomic characteristics of respondents in the conditional logit model.

In order to test for this, attributes were crossed with dummy variables to show interaction coefficients. A number of socio-economic variables (age, education, location, income) and taste variables (architectural expertise) were included in the model. However with such small subgroup sizes, respondents' age, level of

education, gender and household structure showed no significant impact on the preference of any of the attributes (see Appendix 5).   A much larger sample size would be necessary to identify interaction effects. With more responses there is better potential to identify the influence of socio-economic factors, tastes and attitudes in a CLM. For example, it could be possible to compare design preferences for city residents with those from other areas within the state, or homeowners compared to renters, or design preference differences between age groups. People who regularly engage in outdoor physical activity may prefer the use of the park to be for active recreation. Older downtown apartment dwellers may prefer a relaxing space that has a lot of vegetation. These are the types of interactions than could potentially be tested with more respondent data.

3.6.2   Conclusion

This study was a good first attempt to apply the choice experiment (CE) methodology to elicit public preferences for design characteristics and to identify the preferences of the public with respect to an urban open space development using a CE.

The majority of the respondents understood the approach and all but one respondent completed the survey. The majority of respondents indicated that the survey was not too long suggesting that eight choice sets was an appropriate number.

The major finding of this study was that the probability of selecting a development from the three options did depend on the attributes in predictable ways. The conditional logit model was a good fit and the design attributes proved to be statistically significant even with a relatively small sample size.

This study underscores the importance of assessing several landscape design characteristics simultaneously and being able to investigate their relative values.

Like a design project, context and study objectives are very important in a CE. If this type of study was to be employed again for an urban landscape design project, then additional research into the attribute selection and levels should be undertaken. The limited number of attributes used in this study do not necessarily capture all aspects that influence peoples' utility and therefore decision-making. Other attributes that could be incorporated include those that where excluded from the study listed in Appendix 1 as well as others that arose during this study such as security, food production, and crowding. The number of levels per attribute could also be modified. For example, choices were highly influenced by the surface attribute being primarily green. Including more levels for this attribute could capture what type of green space the public prefers such as a preference for lawn, formal gardens, community gardens, meadows, or an urban forest to name a few typologies.

Surface parking lots, transportation networks and large institutions characterize the eastern side of downtown Baltimore. Context is likely to impact results, and the

appropriateness of a transfer of the results to another site.   Even though

approximately 60% of respondents indicated that their choices would unlikely differ

if the park was developed on another downtown site, the possibilities of transferring

the results to another site are an empirical question. Hasan Basri (2011)

investigates the idea of benefit transfer in choice experiments.

It is interesting to note that the characteristics of the public's preferred park from

this choice experiment are largely in line with a recent open space development in

Baltimore's inner harbor. Pierces' Park built in 2012 (Figure 17) is a primarily

green, curvilinear, multi-spaced and activity based park.

Figure 17: Pierce's Park (Baltimore Business Journal, April 2012)
This new park has all the attributes preferred by the public identified in the choice experiment study.

The close proximity of the town hall open space (Figure 18) one block away is

characterized by being "primarily passive", "primarily paved", " rectilinear" and "one

main space". This is direct contrast to the choices made in the study. This does

not necessarily mean a rejection of this type of open space design, but possibly it is

recognition that this type of space already exists and additional spaces should have

different characteristics.

Figure 18: City Hall Plaza (Baltimore Sun, Aug 11, 2010)

City Hall Plaza is one block from the study site. It does not have any of the characteristics preferred
by the public for the study site development.

3.6.3   Limitations

In its limited form, this choice experiment (CE) provides direction for decision

making in the design of the development of a downtown surface parking lot into a

public open space. By conducting a broad design characteristic study at the

beginning of the design process, those attributes important to the public could be identified prior to developing design alternatives.

The methodology applied in a fairly simple manner was fairly reasonable to navigate.   While this study managed to identify preferences and demonstrated that different design attributes deliver value to the public, it leaves many questions unanswered offering opportunities for future research.   The choice experiment technique has potential for landscape architecture design beyond what could be demonstrated in this study, but it is a prospective tool for design making and even policy direction. There are many opportunities for further inquiry.

As Borresch et al. (2009) states "the flexibility of this technique, the reliability of its results, and the possibility to consider and combine the analysis of stated and real choices make this method one of the most promising in applied preference estimation".

The research shows that the public is currently very keen to move away from the status quo. However, parking lot patrons did not participate in the survey and the associated costs in promoting this transition have not been fully investigated.

Cost was not statistically significant. On reflection, tax levels could have been set higher. However, they were purposely kept within realistic limits of a likely budget (based on a recent park development) and to avoid protest responses against rises in local taxes. With better pricing levels providing statically sound data, it would be

possible to compute implicit marginal prices for the attributes of the space. Comparing the ratio between the coefficients for any one attribute and the coefficient for the monetary attribute, everything else being equal, can derive implicit prices for open space attributes. Willingness-to-pay (WTP) estimates can provide estimates of changes in social welfare associated with alternative development strategies. These estimates express the degree of utility a respondent has for an attribute. In this study, the cost attribute was not statistically significant and therefore any estimates of WTP would have to be interpreted cautiously.

There were two main issues with the sampling strategy. First, the population sample was restricted to market patrons only. For a public good project such as a park, the sample should better represent demographics of the user group. It would be useful to extend this survey to include a wider population sample representing at least the downtown population. Second, I was only able to obtain a small sample size due to climatic conditions. While this provided enough data for main effects modeling, it did not allow an in depth analysis of interaction effects. In both cases, an extended time period of the study and more resources would yield greater numbers of respondents and allow better analysis of choices.

The survey does not accommodate any temporal effects. Preferences for open spaces may differ between seasons.

4   Design Implications

Typical of any landscape project, the design is informed by site inventory and analysis and other sources gathered during the design phases.   This choice experiment was conducted in the predesign phase of the design process. It provided evidence from which to form design decisions.

From the choice experiment it was shown that the development of the parking lot into an open space should be a fundamentally green space with a significant active recreation component, utilizing curves and consist of many spaces. The data showed that respondents place greater importance on "Surface" compared to all other non-price attributes when choosing between open space alternatives.

At this point in the design process (before the design phase), engaging the public and the client again is beneficial in order to validate the results, but also to gather more information. For example, while the choice experiment (CE) shows that the public tends to have a preference for an active recreation space, it did not provide details on specific activities and programming to include.   In lieu of this opportunity, three concept alternatives were designed. It is common for a designer to present concept alternatives to clients. It is also common that the public will have not seen a visualization of the development before the design stage other than from precedent studies. A CE therefore can introduce visualizations before the conceptual designs.

4.1 Site Inventory and Analysis

This section of includes the site analysis and research typical of any design project. It provides a contextual approach to the design of the site covering physical, biological and cultural attributes.

4.1.1 Location

The site is within a one-mile radius of the center of downtown and six blocks from the Inner Harbor (Figure 19). The population within the one-mile radius is 40,971. The employment population is 122,222[6]. The adjacent neighborhood to the east is Oldtown.

Figure 19: Downtown Baltimore One-Mile Radius Map

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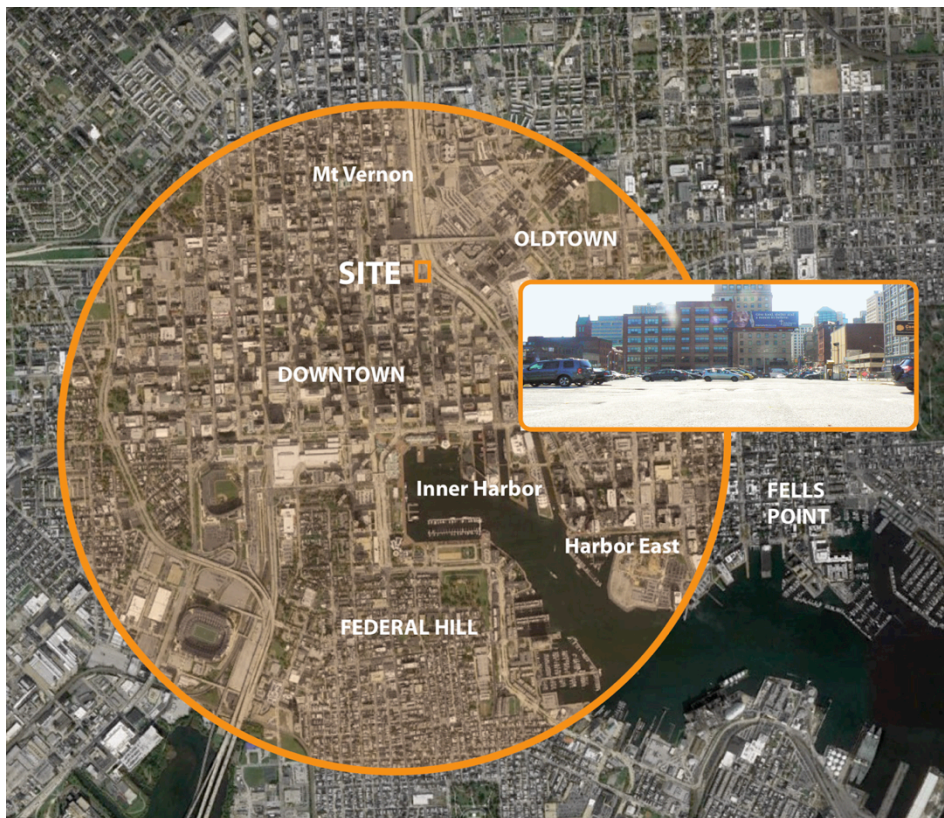
[6] 2013 State of Downtown Report and 2013 Development Report at

www.GoDowntownBaltimore.com

As noted in Section 3.1, the site is a small city block on the eastern edge of the downtown area. It is currently utilized as a user pays surface parking lot with spaces for approximately 187 cars. The rectangular parking lot (Figure 20) is bound by buildings on the south and western sides with the north and east boundary formed by Interstate 83 known as the Jones Falls Expressway (JFX). The Baltimore Farmer's Market operates adjacent to the site under the JFX.

Figure 20: Site Location

Site boundary   Market boundary
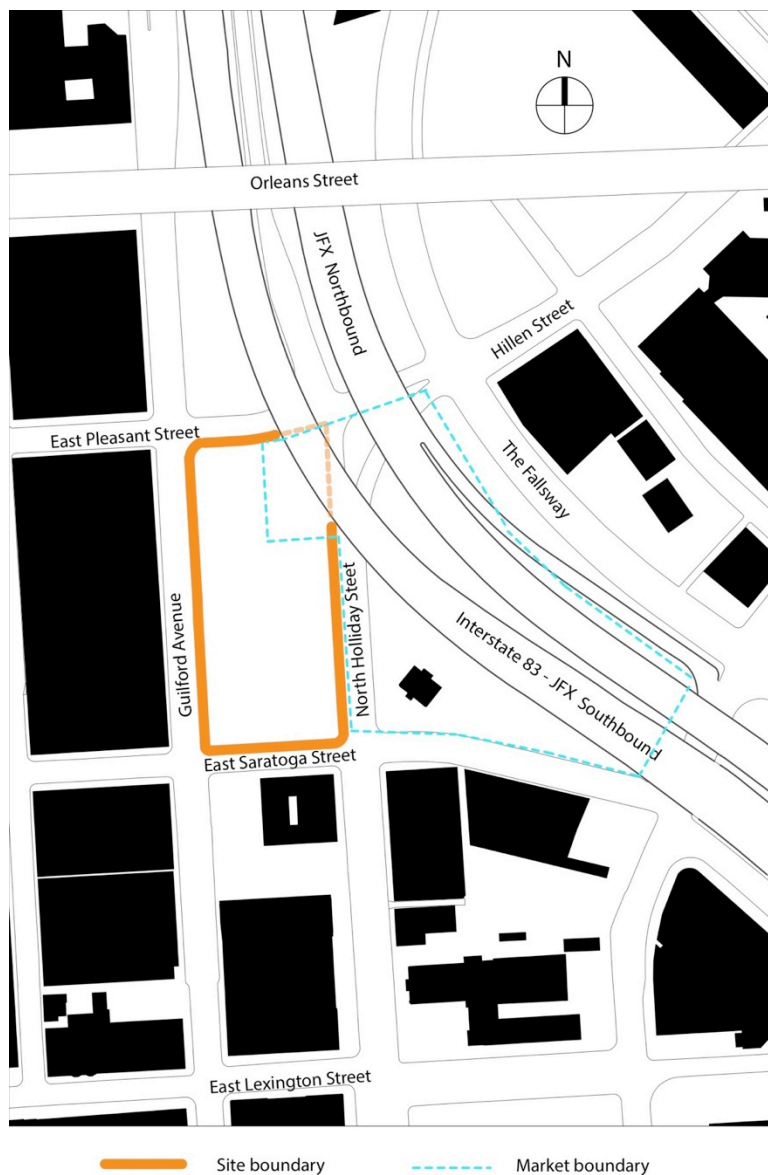
4.1.2 Physical and Biological Attributes

The site is a rectangle shape, 186 feet by 416 feet or approximately 1.8 Acres.   It is relatively flat with just under a 1% slope across the site.   All surfaces are asphalt and there is currently no vegetation on the site or the surrounding sidewalks.

The site is in full shade by 3pm in winter, and in summer the sun is on site until 5pm. The buildings to the west provide a screen for the winter winds. The proximity to large bodies of water and the inflow of southerly winds contribute to the high relative humidity throughout the year.

An arm of the Jones Falls Stream ran through the site in the 1800s. Nowadays the section of the Jones Falls Stream neighboring the site is in a culvert.   The site is subject to inundation by a 1-percent-annual-chance flood event. Mandatory flood insurance purchase requirements and floodplain management standards apply.

4.1.3 Cultural Attributes

The site is zoned commercial and is currently utilized as a user pays surface parking lot with spaces for 187 cars. The charge is $8 per day per vehicle.

The neighboring buildings include residential apartments, parking garages, and an assortment of commercial businesses. An historic terminal warehouse remains vacant although there have been proposals for converting the building into apartments in recent years.

There is a parking lot under the JFX (separate to the study site) and this is utilized as a farmers' market on Sunday mornings. The approximate boundary of the market is shown in Figure 20. At all other times it functions as a parking lot. The Baltimore Farmers' Market uses a portion of the study site for vendors and the remainder of the lot provides parking for market patrons during market times.

The JFX is the dominating view and sound from the site (Figure 21). Aside from the JFX you can see glimpses of the historic Shot Tower and the Pentagon building in the Inner Harbor. Three piers supporting the JFX are within the project site. They have been painted with colorful murals based on market themes.

Figure 21: View from site of JFX

There is a small park adjacent to the site dominated by the Diner building and paving shown in Figure 22. The Diner is not in operation, and the landscaping is

dated and unappealing. Some mature trees and lawn spaces exist but this alone is
not sufficient to encourage use. The Farmers' Market does not utilize this park
other than for parking vehicles. It is recognized that this park is not utilized to its full
potential and has been identified for renovation in Baltimore City's Open Space
Plan (Mahan Rykiel Associates, 2010).

Figure 22: View of Diner Park from the site
The Diner Park opposite the site is scruffy and underutilized.

Historically the area was associated with the storage and movement of goods by
rail (see Figure 23). An historic building still remains that once was a warehouse for
flour. The nation's first elevated streetcar ran along Guildford Avenue terminating
just beyond East Saratoga Street.

Figure 23: Site Context

The top image is a bird's eye view of the site looking south. The bottom left and right images identify the site from the elevated streetcar.

	Diner Park		Site boundary
	Historic warehouse		Elevated street car

Saratoga Street

Guilford Street
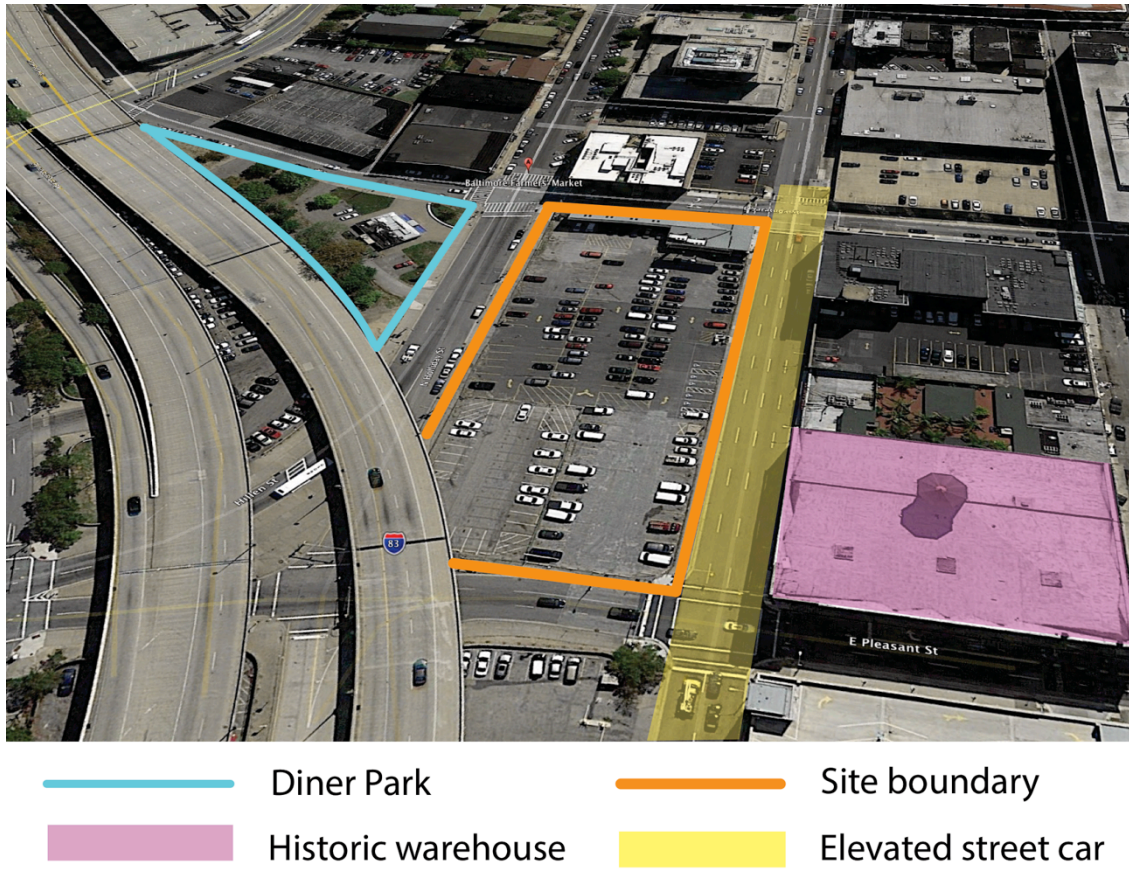
4.1.4   Connectivity

There is good pedestrian access to the site and it is served well by public transport. Pedestrians are accommodated on sidewalks on all boundaries of the site. All intersections are signalized and are provided with crosswalks. There is a bus stop on the south of the site.   The Jones Falls Trail follows The Fallsway east of the JFX. Access between the trail and site is relatively straightforward with the potential to be enhanced through the design of the study site.

Accessing the site is a little more difficult for vehicles. One-way roads bind the site. Due to the one-way direction (refer to Appendix 6) the site is not directly accessible from the south or west forcing one to arrive by vehicle either from the north or east. There are currently no dedicated lanes for cyclists on the road network surrounding the site.

The downtown terminus of the JFX is nearby. Off ramps from the JFX include one on Guilford Avenue half a mile north of the site, and an off ramp on North Holliday Street at the northwestern corner of the site.   The JFX off ramp to North Holliday Street carries approximately 59,000 vehicles each weekday.

During the Farmers' Market North Holliday Street is pedestrianized. Additional temporary or even permanent closure of Holliday Street would allow the site to connect with the Diner Park.

The vehicle count is 59,000 from the JFX off ramp at Holliday Street. It is therefore unlikely that North Holliday Street can be fully pedestrianized. This was not investigated in the design. However, temporary closures could continue or installing traffic calming interventions could alleviate traffic concerns if the street was to remain open to vehicles.

The site is located in an area often referred to as a border vacuum. It is so named because of the barrier created by the elevated JFX to the north and east, and large institutions to the west border it.   Further north-east of the site is a correctional facility and to the east are services for the homeless. From time to time the JFX provides shelter for a transient homeless population. This could potentially give rise to safety concerns by park patrons.

While the JFX remains elevated, visual connectivity between Oldtown and downtown remains a major problem (Figure 24). The conversion of the JFX elevated highway into an at-grade boulevard is an initiative identified in the Oldtown Redevelopment Plan (Urban Design Associates, 2010) and the Baltimore Open Space Plan (City of Baltimore, 2010).   An at-grade boulevard is proposed to facilitate connections from downtown across to Oldtown by removing the visual barrier, and also provide a network of open green space that this project could form part of. A dog park also adjacent to the study site was identified in the open space plan as well. This is another opportunity to increase open space.

Figure 24: JFX Barrier

The elevated expressway acts as a visual barrier between Downtown and Oldtown.

4.1.5   Summary

Given its location in downtown, the site offers great opportunities but also presents many challenges.

The main challenges are associated with the JFX road network. Traffic counts from the off ramps are high and the elevated expressway creates a visual barrier. Combined with large parking lots and institutional buildings the area is unappealing.

However, it is proven that the area can be activated with programming. The Farmers' Market utilizes the elevated JFX as shelter for vendors and patrons. Sunday mornings see thousands of people activating the area for a short period suggesting that the area can be a destination. Outside of market hours the area is desolate. The only reason to be at the site is to park your car.

Figure 25: Summary of Strengths and Challenges

challenges

Traffic

Visual Barrier

Encampments

strengths

Route 40

Hillen Road

P

The Fallsway

I83 North

I83 South

North Holliday Street

P

East Pleasant Street

Guilford Avenue

PARK

B

P

P

East Saratoga Street

P

To Inner Harbor

Destination

Street Closures

Legend	
- - - - - -	Sidewalks
▬ ▬ ▬	Jones Falls Trail
→	Traffic direction
P	Parking
B	Bus stop
▭	Temporary closure

Jones Falls

History

CHARM CITY CIRCULATOR

Accessible

Location

The area's history can be a source of design inspiration. The site once had an arm of the Jones Falls Stream running through it with the main branch of the stream nearby now in a channel. The area is part of the original settlement of the City of Baltimore with a rich industrial history from which to draw design inspiration. Railroads and street cars, including the nation's first elevated street car, navigated the site. The market symbolizes health and continues the site's association with food. Figure 25 highlights the various strengths and challenges of the site.

4.2   Design Alternatives

The primary purpose of the design section of this study is to show how the choice experiment (CE) results can be used to inform a design solution. The outcomes of CE advocate for a vegetated site that facilitates physical activity. These attributes point toward a preference for a healthy place promoting better physical, mental and ecological wellbeing. The Farmers' Market is consistent with a healthy lifestyle focusing on food production, nutrition and community. The respondents were young, active, educated and health conscious.

The site analysis provided further inspiration for concepts, elements and materials. The designs borrow from a history of the passage of people and goods. People can move around the park discovering different sections and opportunities for interaction program elements.   It is expected the park be a utilized destination every day of the week.

For all these reasons, the notion of health was used as the basis for programming and design concepts.

Design of street frontage along Holliday Street can facilitate the continued and additional use by the market. The street can be kept open to traffic with the continued practice of pedestrianizing the street on occasions. The Guildford Street frontage demands a physical barrier between the park and the one-way street for additional safety. The northern corners of the park can benefit from traffic noise calming devices such as a water feature or vegetation. Connections between the proposed dog park and the Diner Park renovation are strengthened.

As directed by the CE, each concept park is to be composed of many different spaces. This was preferred over one large space that could facilitate flexible programming. Flexible use of at least one of the spaces is still considered important to include in the designs. The design language utilizes curves. This is not a strict requirement as curvilinear geometry was considered the least significant attribute in the CE.

The designs do not address the future initiative of an at-grade boulevard. This is a long-term initiative that will not necessarily have any impact on the expected life of this park. Streetscape improvements can contribute to counterbalancing the surrounding urban area by providing scenic and environmental quality as well as improving connectivity between neighborhoods.

Figure 26: Opportunities and connections

Dog park

JFX

Streetscape

Pedestrians

Diner park

Food/Markets

Healthy living

opportunities & connections

P

I83 North

JFX

Dog park

Farmers' Market

JFX   I83 South

Diner Park

To I

P

	Edge treatment		Water flow		New/upgraded park
	Pedestrian connections		Noise barrier		Existing trees
	Traffic direction		Market use		New streetscape

ACTIVE OPEN SPACE

Interpretation

History

Movement

Three design concept alternatives are provided. The first design is based on the CE profile that was most likely to be chosen by the public. Two more alternative designs develop the design further to incorporate additional design opportunities identified from the site analysis

Consistent with the CE profiles, all the concept alternatives include a similar number of trees, variation of vegetation including a lawn area and gardens, a water feature, plays areas and edge treatments for noise and safety.

All facilitate pedestrian connectivity, market connectivity and visual permeability into and across the site.

4.2.1 Design Alternative One

Design Alternative One (Figures 27 & 28) is one of the 16 choice profiles included in the choice experiment. It is the hypothetical park alternative that is most likely to be chosen by the public.

Figure 27: Site Plan Alternative One
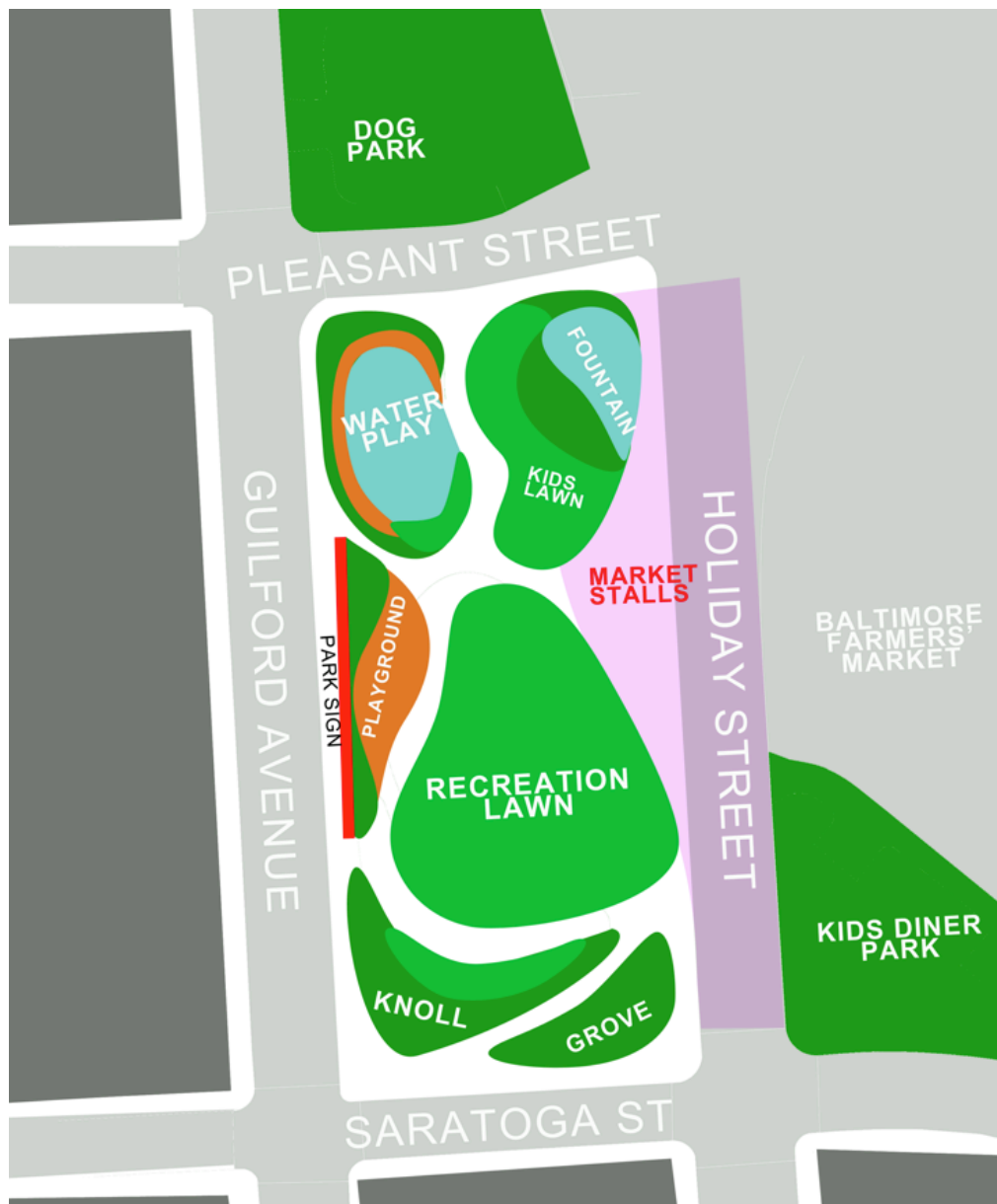
Figure 28: Perspective looking south across the site

4.2.2   Design Alternative Two

The second design (Figures 29 & 30) is an ecological based design response with a focus on environmental health and nutrition. Reference is made to the Jones Falls Stream and the site's relationship with food.

Additional programming allows the community to engage with the site by including community gardens, an orchard and interpretative ecological elements.

Figure 29: Site Plan Alternative Two
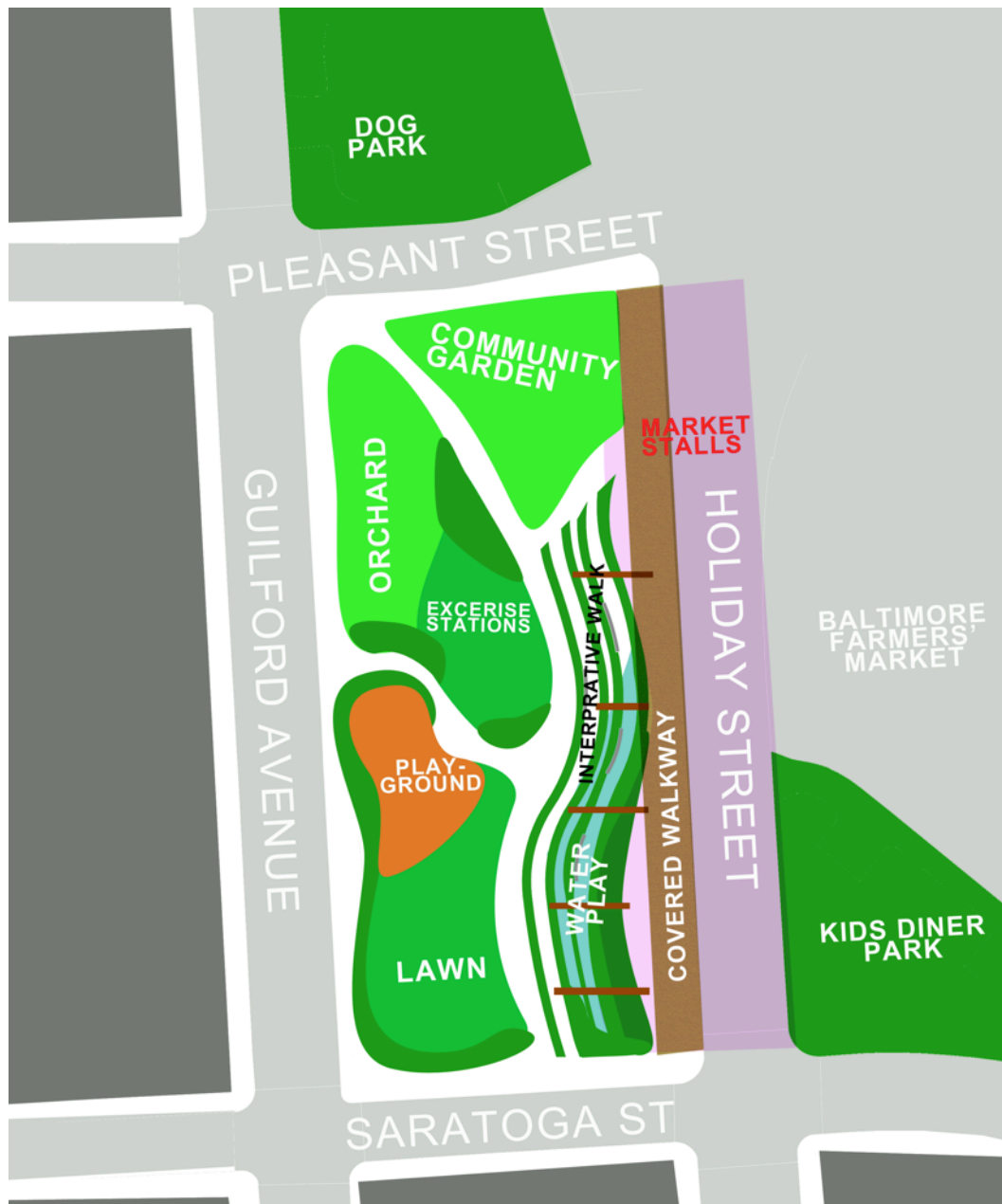
Figure 30: Perspective Alternative Two looking south across the site

4.2.3   Design Alternative Three

The third alternative (Figures 31 & 32) uses the concept of health again with a focus on physical fitness and interaction. The design is more contemporary and uses color as a dynamic force to counteract the drab conditions of the JFX. Vertical elements are incorporated referencing the language of the JFX piers. The design also borrows from a history of the passage of people and goods.

Programming allows the community to move around the park discovering different sections and opportunities for interaction through exercise, play equipment and art installations.

Figure 31: Site Plan Alternative Three
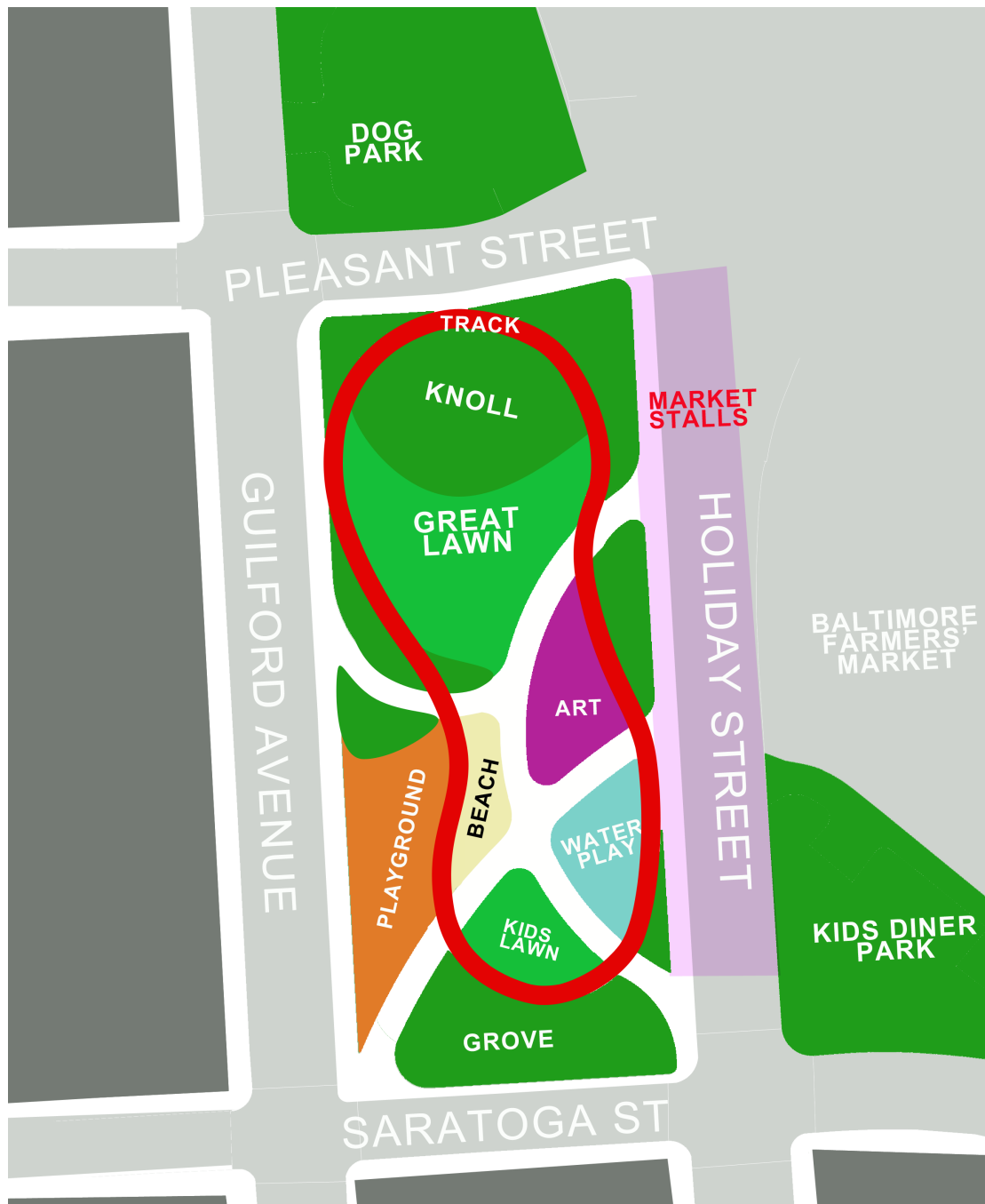
Figure 32: Perspective Alternative Three looking south across site

5 Conclusion

Empirical evidence from a choice experiment was sought to better inform the decision making throughout the design process. In its limited form, this choice experiment study provided clear direction for making design decisions for the development of a downtown surface parking lot into a public open space. By conducting the choice experiment (CE) at the beginning of the design process, those attributes significant to the public in the choice of a park where identified prior to developing conceptual design alternatives. Design decisions could then be made with better clarity and confidence that the design solution will provide utility and value to the public.

Landscape architects do not currently utilize the choice experiment methodology in their design process. The purpose of this CE study was neither to determine a specific program nor to seek out specific community goals. A more complex CE could be designed to achieve this. This study was an exploratory application of the methodology. The methodology proved a useful mechanism to elicit public preferences for an urban open space design. Its contribution to the design process was valuable as there was significant clarity for the designer at the outset. The design alternatives could be produced quickly and with confidence that they were responding to the public's preferences and would maximize their utility.

While choice experiments (CE) have some limitations and challenges[7], they offer a structured approach, consistent with economic theory, to assessing public preferences for developments and utility. They are one method among many evidence-based techniques that seeks out public preferences. The survey-based approach of a CE is advantageous as it allows better representation of the population. It is important to note that the outcomes of a CE will not meet the preferences of all individuals, and therefore may lead to decisions that exclude individual choices. Analysis on choices between groups of people is possible when sufficient data is collected. This can help to identify preference differences between groups. Other public participation techniques and analysis can also be used in conjunction with the CE. Public participation should be ongoing throughout the design process and in many forms to better ensure that minority groups are protected.

This study offers a formal structure for public participation opportunities in the design of a public open space by using the choice experiment tool of data specification, modeling and application. Future studies may aim to move beyond this case study and replicate research. There is scope for more detailed work including looking at additional attributes the public may respond to, efficacy of graphic representation, participation and econometric analysis.

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[7] choice-task complexity and cognitive effort, experimental design, preference and scale heterogeneity, endogeneity or model uncertainty

Finally, it is also important that design interventions that aim to implement the

findings from a CE study are validated through subsequent performance monitoring

and evaluation. As CEs are grounded in solid research and based on clearly

defined intentions, this makes it possible to study post occupancy.

Appendix 1: Attributes excluded from the study

Attributes	Reason for exclusion
Identity	Refers to the uniqueness of the site. The majority of those interviewed considered that a unique site identify was very important.
Ecological integration	Refers to the integration of ecological processes. The general public interviewed did not understand this concept. They suggested the term environmental or sustainable. I decided to exclude this attribute in the interests of keeping the design simple (comprehensible) and that the integration of ecological processes were fundamental to a sustainable site design - the responsibility of the designer.
Amenities	Refers to the inclusion of site amenities such seating, lighting, equipment. This attribute would have been useful to include. However at the time of the designing the experiment, including different levels of amenities and including a cost attribute became problematic due to my inexperience with the methodology. Amenities could have been used as a pivot attribute. To overcome this problem, I decided to include a baseline level of amenities in each choice profile.
Plant materials	Refers to the use of native and non-native plants. This is difficult to represent graphically for those with limited native plant knowledge. This attribute could introduce a bias for those with no knowledge of plant materials. A lack of interest for native plants could signal a need for policy changes.

Topography	Refers to the variation in level changes of the site. The design experts favored this for inclusion, but the public was less interested. This was ultimately deemed to be in the domain of the designer.

My name is Robyn Edwards.
I am a Landscape Architecture Master's student at the
University of Maryland College Park. This research is part of my final thesis project.

I am interested in gaining a general understanding of what
open space design characteristics
are important to you, a member of the public.

To help me determine what you prefer,
you will be asked to
choose your preference
between example designs

for the development of a
surface parking lot
into a public open space

The information from the survey will then be used to develop
a design that reflects the public's choices.

My research uses the following study site:
The parking lot - adjacent to the Baltimore Farmers' Market.

While there are no plans to develop this particular site into a public open space, the findings
survey will provide useful insights for future open space developments.

**I would be most grateful if you could take about 10 minutes to complete this
questionnaire.**

Responses are strictly confidential and there are no correct or wrong answers; I just want yo
opinion. **Thank you in advance for your cooperation.**

Section One

Open space perceptions and interests

Q1. **Interests**

	Not At All	Occasionally	Frequently
Do you garden?	○	○	○
Do you visit art galleries or museums?	○	○	○
Do you visit farmers' markets?	○	○	○
Do you visit the Baltimore waterfront or other parks in the city?	○	○	○
Do you enjoy outdoor physical activity?	○	○	○
Do you use the parking lot at this location?	○	○	○

Q2. **Are you familiar with any of the following certifications?**

	Never heard of it	Heard of it	Professional knowledge
SITES	○	○	○
LEED	○	○	○

Q3. **In your opinion, what is the most important aspect to consider in the design of an urban outdoor space?**

○ Community

○ Environment

○ Aesthetics

○ Other

○ I don't know

Q4. **Choose one outdoor space type that you think is most lacking in downtown Baltimore.**

○ Outdoor sports facilities

○ Parks and gardens

○ Plazas and market places

○ Community gardens and urban farms

○ Other

○ I don't know

Section Two
Choosing the designs <u>you</u> prefer

This page only contains information about how the example designs are put together.

- The designs are based on **four basic design characteristics only**. They are broad ideas and will form the basis of further design work.

    1. Use - what can happen in the space
    2. Surface - what material the ground consists of
    3. Geometry - the shpaes that make up the design layout
    4. Complexity - how the space is divided up

- Each characteristic has **two alternatives (levels).**

- A **cost attribute** is also included with four payment levels**.**

Q6. **Which option would you choose?** *(1 of 8)*

For each choice scenario that follows, you will be presented with **two example designs (Option A and Option B) plus Option C. Options C will always be to keep the parking lot as is at no extra cost.**

Please consider:
- Whether or not these improvements are important to you;
- Any money you pay towards the improvements here will not be available for you to spend on other things;

Option A	Option B	Option C

Click to see a larger image

Click to see a larger image

Click to see a larger image

	Option A		Option B		Option C
Use	Primarily active	Use	Primarily passive		
Surface	Primarily green	Surface	Primarily paved		
Complexity	Many defined spaces	Complexity	One main space		
Geometry	Curvilinear	Geometry	Rectilinear		Retain parking lot
Cost	$10.00 one off tax	Cost	$25.00 one off tax	Cost	NO ADDITIONAL COST

○   ○   ○

Q7. **Which option would you choose?** *(2 of 8)*

Option A	Option B	Option C

Click to see a larger image

Click to see a larger image

Click to see a larger image

	Option A		Option B		Option C
Use	Primarily passive	Use	Primarily active		
Surface	Primarily paved	Surface	Primarily green		
Complexity	Many defined spaces	Complexity	One main space		
Geometry	Rectilinear	Geometry	Curvilinear		Retain parking lot
Cost	$20.00 one off tax	Cost	$25.00 one off tax	Cost	NO ADDITIONAL COST

○   ○   ○

Q8. Which option would you choose? *(3 of 8)*

Option A	Option B	Option C

Click to see a larger image

Click to see a larger image

Click to see a larger image

	Option A		Option B		Option C
Use	Primarily active	Use	Primarily passive		
Surface	Primarily paved	Surface	Primarily green		
Complexity	Many defined spaces	Complexity	One main space		Retain parking lot
Geometry	Curvilinear	Geometry	Rectilinear		
Cost	$15.00 one off tax	Cost	$10.00 one off tax	Cost	NO ADDITIONAL COST

Q9. Which option would you choose? *(4 of 8)*

Option A	Option B	Option C

Click to see a larger image

Click to see a larger image

Click to see a larger image

	Option A		Option B		Option C
Use	Primarily active	Use	Primarily passive		
Surface	Primarily green	Surface	Primarily paved		
Complexity	Many defined spaces	Complexity	One main space		Retain parking lot
Geometry	Rectilinear	Geometry	Curvilinear		
Cost	$20.00 one off tax	Cost	$15.00 one off tax	Cost	NO ADDITIONAL COST

Option A		Option B		Option C	
Click to see a larger image		Click to see a larger image		Click to see a larger image	
Use	Primarily passive	Use	Primarily active		
Surface	Primarily paved	Surface	Primarily green		
Complexity	Many defined spaces	Complexity	One main space		
Geometry	Curvilinear	Geometry	Rectilinear		
Cost	$10.00 one off tax	Cost	$15.00 one off tax	Cost	Retain parking lot NO ADDITIONAL COST
○		○		○	

Option A		Option B		Option C	
Click to see a larger image		Click to see a larger image		Click to see a larger image	
Use	Primarily active	Use	Primarily passive		
Surface	Primarily paved	Surface	Primarily green		
Complexity	One main space	Complexity	Many defined spaces		
Geometry	Curvilinear	Geometry	Rectilinear		
Cost	$20.00 one off tax	Cost	$15.00 one off tax	Cost	Retain parking lot NO ADDITIONAL COST
○		○		○	

Q12. **Which option would you choose?** *(7 of 8)*

Option A	**Option B**	**Option C**

Click to see a larger image

Click to see a larger image

Click to see a larger image

	Option A		Option B		Option C
Use	Primarily passive	Use	Primarily active		
Surface	Primarily green	Surface	Primarily paved		
Complexity	One main space	Complexity	Many defined spaces		
Geometry	Curvilinear	Geometry	Rectilinear		Retain parking lot
Cost	$20.00 one off tax	Cost	$25.00 one off tax	Cost	NO ADDITIONAL COST

○   ○   ○

Q13. **Which option would you choose?** *(8 of 8)*

Option A	**Option B**	**Option C**

Click to see a larger image

Click to see a larger image

Click to see a larger image

	Option A		Option B		Option C
Use	Primarily passive	Use	Primarily active		
Surface	Primarily green	Surface	Primarily paved		
Complexity	Many defined spaces	Complexity	One main space		
Geometry	Curvilinear	Geometry	Rectilinear		Retain parking lot
Cost	$25.00 one off tax	Cost	$10.00 one off tax	Cost	NO ADDITIONAL COST

○   ○   ○

95

Q14. **How often do you think you would visit a park in this location?**

○ All the time (many times a week)

○ Frequently (weekly)

○ Occasionally (monthly or less)

○ Only when the Farmers Market is operating

○ Never

Q15. **Do you think the choices you made between park options would differ if the park was developed on a lot somewhere else in the downtown area (excluding the waterfront)?**

○ Very Unlikely

○ Unlikely

○ Undecided

○ Likely

○ Very Likely

Section Three
Demographic Information

Q16. **Do you live within 6 blocks of the parking lot?**

○ Yes

○ No,

What neighborhood do you live in?

[   ]

Q17. **Do you work within 6 blocks of the parking lot?**

○ Yes

○ No

Q18. **What is your gender?**

○ Male

○ Female

96

Q19. **What is your race?**

○ White/Caucasian

○ Black or African American

○ American Indian or Alaska Native

○ Asian

○ Pacific Islander

○ Other race

○ Two or more races

○ Hispanic or Latino (of any race)

○ Other

Q20. **What is your age?**

○ 18-25 years

○ 26-34 years

○ 35-54 years

○ 55-64 years

○ 65 years and over

Q21. **What is your employment status?**

☐ Employed

☐ Unemployed

☐ Retired

☐ Student

☐ Other

Q22. **What is your combined annual household income?**

○ Below $40,000

○ $40,000 and above

Q23. **What is the highest level of education you have completed?**

○ Some high school

○ High school completion

○ Some college

○ Vocational certificate

○ Associate's degree

○ Bachelor's degree

○ Master's degree

○ Doctorate degree

○ Professional degree

○ Other

Q24. **How many people live in your household including yourself?**

○ 1

○ 2

○ 3

○ 4

○ 5

○ More than 5

Q25. **Is your primary residence**

○ Owned by someone in the household?

○ Rented?

○ Other

Q26. **Do you have children in your household who are 18 years or younger?**

○ Yes

○ No

Section Four
Survey Comments

Q27. **Was the survey...**

	No	Somewhat	Yes
Easy to understand	○	○	○
Too long?	○	○	○

Q28. **What was more helpful in making choices between design options?**

Equally helpful

Image | ○ ○ ○ ○ ○ ○ | **Written Description**

99

Appendix 3: Supporting Survey Information

Passive

Recreation activities that do not require significant facilities:

Active

Recreation activities that require facilities:

<div style="text-align:center">

sitting
walking
viewing

</div>

<div style="text-align:center">

sports fields
play areas
skating rinks
outdoor theaters

</div>

SURFACE

Green

The living parts of a landscape:

lawn
ground cover
trees, shrubs, flowers, grasses
gardens
natural water

Paved

The inanimate objects in the landscape:

walkways
plazas
walls
artifical water features
structures

Rectilinear
- designs that utilize straight lines can be more more formal

Curvilinear
- designs that utilize curves can be organic, natural and free flowing

VISUAL COMPLEXITY

One main space
- the design is dominated by one large flexible space but also may have secondary spaces

Many spaces
- the design has many spaces that have been designed for specific uses

Appendix 4: Additional Statistical Tables

Activities and interest in open spaces

	N	%
Frequently engages in outdoor physical activity	44	75
Garden	42	71
Frequently visit parks	28	47
Frequently visit galleries	12	20
Frequently visit farmers markets	31	53
Have some sustainable practices design knowledge	19	32

The most important aspect in the design of an urban outdoor space

	N	%
Aesthetics	7	12
Community	32	54
Environment	19	32
Other	1	2

Outdoor space most lacking in downtown Baltimore.

	N	%
Community gardens and urban farms	19	32
I don't know	1	2
Outdoor sports facilities	8	14
Parks and gardens	26	44
Plazas and market places	5	8

Concerns about existing downtown parks.

	N	%
Crime and safety	23	39
I don't know	2	3
Not enough of them	21	36
Other	5	8
Outdated facilities	8	14

Appendix 5: Interactions Model

Attribute	Reference Level	Coefficient	z test
ASC (open space development)	Status quo – parking lot	2.90*	9.08
Use (primarily passive)	Primarily active	-0.17*	-3.21
Surface (primarily green)	Primarily paved	0.34*	6.58
Shape (curvilinear)	Rectilinear	0.10*	2.03
Space (many)	One many space	0.15*	2.95
Cost		0.15	0.49
Age_Cost		-0.13	-1.66
OwnHome_Cost		0.15	1.17
Income_Cost		-0.07	-0.49
Expert_Design		0.11	0.67

* significance at 5% level

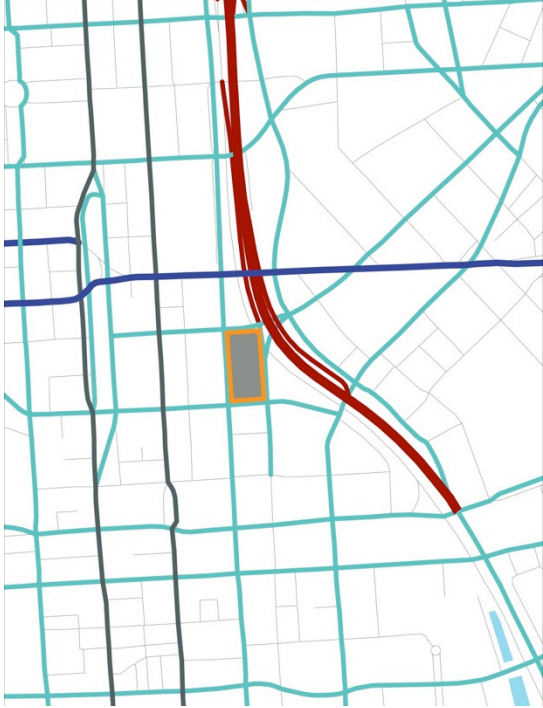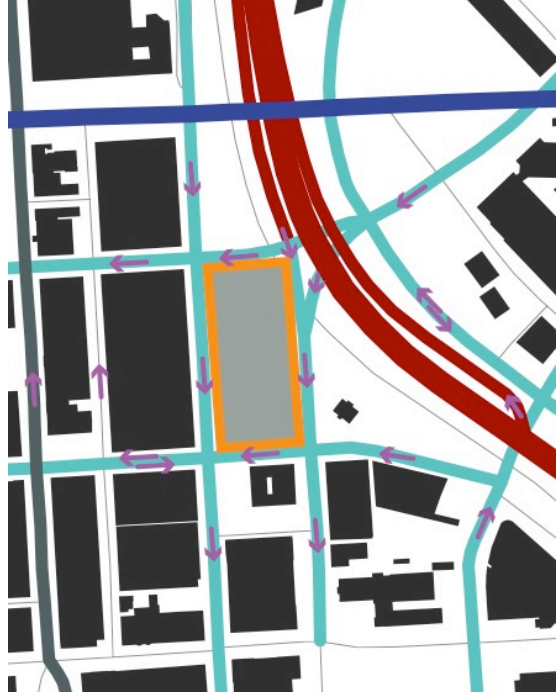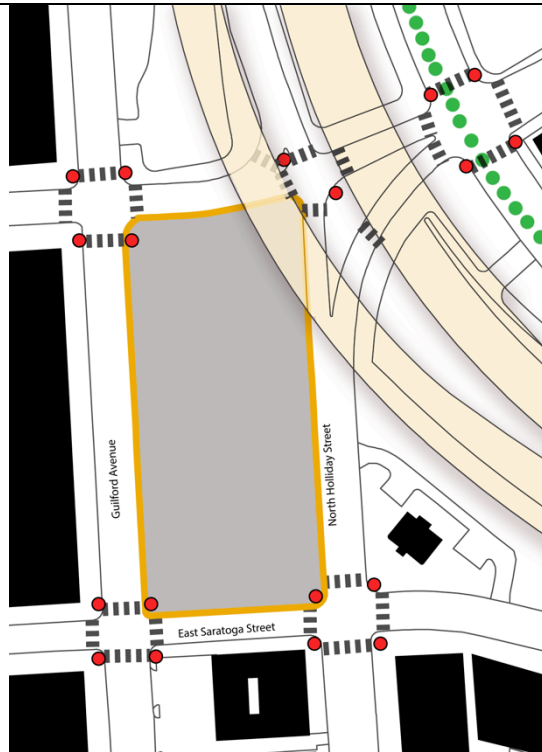|	
Log-L	-347.338
Adj-Pseudo R2	0.33
LR chi^2 (10)	346.41
Prob>chi	0.0000
N (choices)	1416
N (groups)	472

Appendix 6: Additional Site Inventory
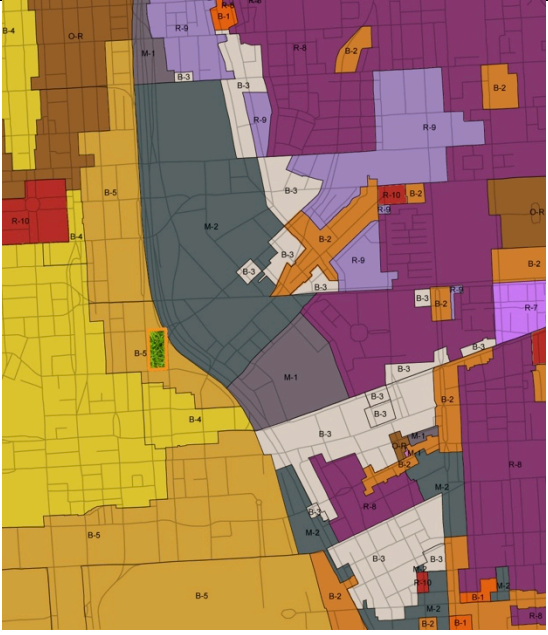
Figure 25: Zoning Designations	Figure 26: Land Uses
The site is in the central commercial district zone. To the west is the central business district. To the east is a mixture of zoning with the industrial zoning dominating the closest. Commercial and residential development is likely and has the potential to increase the daytime and nighttime population and demand for public open space.	The area surrounding the site is dominated by surface parking lots (grey), transportation networks (red), and large institutions (prison, hospitals and other health services, Post Office).

Other green spaces of note near the park include the Diner, Preston Gardens, Memorial Plaza, Mt Vernon and the Holocust Memorial. These are all flagged for future redevelopment. |

Figure 27: Road Pattern	Figure 28: Road Network
The street grid is orientated in southwest- to-northeast direction. Guilford Avenue and North Holliday Street are north- south oriented surface roadways. The east-west East Pleasant Street intersects with Hillen Street to the east. Hillen Street is orientated in a diagonal direction continuing under the JFX and provides a connection to the Johns Hopkins medical campus. East Saratoga Street on the southern boundary of the site eventually continues under the JFX changing to a diagonal orientation.	VEHICULAR ACCESS All roads bounding the site are one way. Both north-south roads run south in the direction of the Inner Harbor. Access to the southern end of the site is an indirect from Gay Street left on to Saratoga Street. The site is near the terminus of the JFX. Off ramps from the JFX include one on Guilford Avenue xx miles from the site, and an off ramp on North Holliday Street at the northwestern corner of the site. The JFX off ramp to North Holliday street carries approximately 59,000 vehicles each weekday. During the Farmers' Market North Holliday Street is pedestrianized.

Figure 29: Pedestrian Access	Figure 30: Public Transport (Source: MTA)
PEDESTRIANS Pedestrians are accommodated on sidewalks on all boundaries of the site. All intersections are signalized and are provided with crosswalks. The Jones Falls Trail follows The Fallsway east of the JFX. Access to the trail from the site is relatively straightforward.	**BUS** The area is served by several bus routes operated by the Maryland Transit Administration (MTA). Service is provided on all streets bordering the site. A MTA Subway service is provided further south of the project area with a nearby station at the Shot Tower (at the intersection of President Street and Fayette Street) - a comfortable walking range.

Figure 31: Parking Options	**Figure 32: Flood zones**
PARKING Surface parking lots are available under the JFX and there are many parking buildings and surface lots within walking distance of the site accommodating up to xxxx vehicles. Limited street parking for approximately 10 cars is also available on Guilford and North Holliday Streets.	FLOODING The site is in an area subject to inundation by the 1-percent-annual-chance flood event determined by detailed methods. Mandatory flood insurance purchase requirements and floodplain management standards apply. The other color is 0.2 % annual chance of a flood hazard.

Bibliography

Adamowicz, W., Louviere, J., Williams, M. (1994). Combining revealed and stated preference methods for valuing environmental amenities. *Journal of Environmental Economics and Managemen*t, 26, 271–292.

Adamowicz, W., Boxall, P., Williams, M., Louviere, J., (1998). Stated preference approaches for measuring passive use values: choice experiments and contingent valuation, *American Journal of Agricultural Economics,* 80, 64–75.

Alberini, A., Riganti, P., Longo, A. (2003). Can People Value the Aesthetic and use Services of Urban Sites? *Journal of Cultural Economics*, 27, 193-213

Al-Kodmany, K. (1999). Using visualization techniques for enhancing public participation in planning and design: process, implementation, and evaluation. *Landscape and Urban Planning*, *45*(1), 37-45.

Altschuler, A. (1970). *Decision-making and the Trend Toward Pluralistic Planning. In Urban Planning in Transition*. Ernest Erber (Ed.). New York: Grossman Publishers.

Bateman, I., R. Carson, B. Day, W. Hanemann, N. Hanley, T. Hett, M. Jones-Lee, G. Loomes, S. Mourato, E. Ozdemiroglu, D. Pearce, R. Sugden, and J. Swanson (2002). *Economic Valuation with Stated Preference Techniques: A Manual*. Cheltenham: Edward Elgar Publishing.

Ben-Akiva, M., Lerman, S., 1985. *Discrete Choice Analysis: Theory and Application to Travel Demand,* Boston: The MIT Press.

Bennett, J., & Blamey, R. (Eds.). (2001). *The Choice Modeling Approach to Environmental Valuation*. Cheltenham: Edward Elgar Publishing.

Berry, J., Portney, K. et al. (1993) *The Rebirth of Urban Democracy*. Washington, DC: Brookings Institution.

Booth, N. K. (1989). *Basic Elements of Landscape Architectural Design*. Illinois: Waveland Press.

Borresch, R., Mass, S., Schmitaz, K., Schmitz, P., (2009), Proceedings from AEC '09: *Modeling the value of a multifunctional landscape*, Agricultural Economics Beijing, China

Borgers, A., Vosters, C., (2011). Assessing preferences for mega shopping centres: A conjoint measurement approach, *Journal of Retailing and Consumer Services,* 18, 322–332.

Brown, R. D., & Corry, R. C. (2011). Evidence-based landscape architecture: The maturing of a profession. *Landscape and Urban Planning*, *100*(4), 327-329.

Carson, R. T., & Louviere, J. J. (2011). A common nomenclature for stated preference elicitation approaches. *Environmental and Resource Economics*, *49*(4), 539-559.

Champ, P. A., Boyle, K. J., & Brown, T. C. (Eds.). (2003). *A primer on nonmarket valuation* (Vol. 3). Springer.

Chung, C., Boyer, T. and Han, S. (2011), How many choice sets and alternatives are optimal? Consistency in choice experiments. *Agribusiness*, 27, 114–125.

Colombo, S., Calatrava-Requena, J., & Hanley, N. (2007). Testing choice experiment for benefit transfer with preference heterogeneity. *American Journal of Agricultural Economics*, *89*(1), 135-151.

Cushing, C., & Cushing, B. (2007). Conditional Logit, IIA, and Alternatives for Estimating Models of Interstate Migration. In *annual meeting of the Southern Regional Science Association.* Charleston, SC.

Francis, Mark. 2003. *Urban open space: Designing for user needs* . Landscape Architecture Foundation Land and Community Design Case Study Series. DC: Island Press.

Fukahori, K., & Kubota, Y. (2003). The role of design elements on the cost-effectiveness of streetscape improvement. *Landscape and Urban Planning*, *63*(2), 75-91.

Gies, E. (2007). *The health benefits of parks: how parks help keep Americans and their communities fit and healthy*. San Fransisco: Trust for Public Land.

Hanley, N., Mourato, S., & Wright, R. E. (2001). Choice Modelling Approaches: A Superior Alternative for Environmental Valuation? *Journal of Economic Surveys*, *15*(3), 435-462.

Hanley, N., Wright, R. E., & Alvarez-Farizo, B. (2006). Estimating the economic value of improvements in river ecology using choice experiments: an application to the water framework directive. *Journal of environmental management*, *78*(2), 183-193.

Hanley, N., Wright, R., Adamowicz, V. (1998) Using Choice Experiments to Value the Environment, *Environmental and Resource Economics,* 11 (3-4): 413-428

Hasan Basri, B. (2011). *Valuing the attributes of Malaysian recreational parks: a choice experiment approach* (Doctoral dissertation, Newcastle University).

Helfand, G. E., Park, J. S., Nassauer, J. I., & Kosek, S. (2006). The economics of native plants in residential landscape designs. *Landscape and Urban Planning*, *78*(3), 229-240.

Hensher, D. and Johnson, L. (1981). *Applied Discrete-Choice Modelling*, London: Halsted Press

Hensher, D., Rose, J. and Greene, W. (2005). *Applied Choice Analysis: A Primer*, Cambridge: Cambridge University Press

Horne, P., & Petäjistö, L. (2003). Preferences for alternative moose management regimes among Finnish landowners: A choice experiment approach. *Land Economics*, *79*(4), 472-482.

Hoyos, D. (2010). The state of the art of environmental valuation with discrete choice experiments. *Ecological economics*, *69*(8), 1595-1603.

Involve. (2005). *People and Participation*. Retrieved from http://www.involve.org.uk/wp-content/uploads/2011/03/

Irvin, R A. , Stansbury, J., (2004) Citizen Participation in Decision Making: Is It Worth the Effort?, *Public Administration Review*, 64 (1), 55-65.

Kanninen, B. J. (2002). Optimal design for multinomial choice experiments. *Journal of Marketing Research*, *39*(2), 214-227.

Kanninen, B.J. (Ed.), 2007. *Valuing Environmental Amenities Using Stated Choice Studies.* Dordrecht: Springer

Kuhfeld, W. F. (2010). Discrete choice. *SAS Technical Papers, MR F, 2010*, 285-663. TS-643.

Kuhfeld, W., Tobias, R., Garratt, M., 1994 Efficient Experimental Design with marketing Research Applications, *Journal of Marketing Research*, 31(4), 545-557

Lazari, A., Anderson, D. 1994 Designs of Discrete Choice Set Experiments for Estimating Both attribute and Availability Cross Effects, *Journal of Marketing Research*, 31, 375-383

LaGro, J. A. (2011). *Site Analysis: A Contextual Approach to Sustainable Land Planning and Site Design*. New Jersey: John Wiley & Sons.

Lancsar, E., & Louviere, J. (2008). Conducting Discrete Choice Experiments to Inform Healthcare Decision Making. *Pharmacoeconomics*, *26*(8), 661-677.

Louviere, J. J., & Hensher, D. A. (1982). *Design and Analysis of Simulated Choice or Allocation Experiments in Travel Choice Modeling,* Transportation Research Board.

Louviere, J.J. & Woodward, G. (1983). Design and analysis of simulated consumer choice or allocation experiments. *Journal of Marketing Research 20*, 350-367.

Louviere, J. J., Hensher, D. A., & Swait, J. D. (2000). *Stated choice methods: analysis and applications*. Cambridge University Press.

McConnell, V., & Walls, M. A. (2005). *The value of open space: Evidence from studies of nonmarket benefits*, Washington, DC: Resources for the Future.

McClure, W., Byrne, A., & Hurand, F. (1997). Visualization techniques for citizen participation. *1997) The Rural Town: Designing for Growth and Sustainability. Moscow, ID: University of Idaho, Center for Business Development and Research.*

McFadden, D., 1974. Conditional logit analysis of qualitative choice behavior. In: Zarembka, P. (Ed.), Frontiers in Econometrics. New York: Academic Press.

McHarg, I. (1969). *An ecological method for landscape architecture*.

Mahan Rykiel Associates. (2010, December 10). *Baltimore City Open Space Plan*. Retrieved from http://www.godowntownbaltimore.com/docs

Mehrhoff, W. A. (1999). *Community design: A team approach to dynamic community systems*, London: Sage Publications.

Mogas, J., Riera, P., Bennett, J. (2006). A comparison of contingent valuation and choice modelling with second-order interactions. *Journal of Forest Economics,* 12, 5–30.

Morris, J., Colombo, S., Angus, A., Stacey, K., Parsons, D., Brawn, M., & Hanley, N. (2009). The value of public rights of way: A choice experiment in Bedfordshire, England. *Landscape and Urban Planning*, *93*(1), 83-91.

Nordwall, U., & Olofsson, T. (2011). A Quantitative Approach for Valuating Architectural Qualities. *Open Construction and Building Technology Journal*, *5*, 105-112.

Urban Design Associates, Oldtown Redevelopment Plan (May 2010) Retrieved from http://archive.baltimorecity.gov/Government/AgenciesDepartments /Planning/MasterPlansMapsPublications

Palerm, Juan R. 2000. An empirical-theoretical analysis framework for public participation in environmental impact assessment. *Journal of Environmental* Planning *and Management*, 43 (5), 581-600.

Potapchuk, W. R. (1996). Building sustainable community politics: Synergizing participatory, institutional, and representative democracy. *National Civic Review*, *85*(3), 54-59.

Rambonilaza, M., & Dachary-Bernard, J. (2007). Land-use planning and public preferences: What can we learn from choice experiment method?. *Landscape and Urban Planning*, *83*(4), 318-326.

Rose, J. M., & Hensher, D. A. (2004, June). Handling individual specific availability of alternatives in stated choice experiments. In *7th International Conference on Travel Survey Methods, Los Suenos, Costa Rica*.

Rowe, G., & Frewer, L. J. (2000). Public participation methods: A framework for evaluation. *Science, technology & human values*, *25*(1), 3-29.

Sandor, Z., & Wedel, M. (2001). Designing conjoint choice experiments using managers' prior beliefs. *Journal of Marketing Research*, *38*(4), 430-444.

Sanoff, H. (2000). *Community participation methods in design and planning*. John Wiley & Sons.

Sanoff, H. (1991). *Visual research methods in design*. John Wiley & Sons Inc.
Chicago

SEED. (2011). *Measuring the financial impact of a public market: Baltimore Farmers Market (JFX) 2011*. Retrieved from http://www.marketumbrella.org/_downloads

Smith, H. H. (1993). The citizen's guide to planning. Chicago: American Planning Association

Stokman, A., & von Haaren, C. (2012). Integrating science and creativity for landscape planning and design of urban areas. *Applied Urban Ecology: A Global Framework*, 170-185.
Chicago

Swaffield, S. (Ed.). (2002). *Theory in landscape architecture: a reader*. University of Pennsylvania Press.

Thwaites, K., Helleur, E., & Simkins, I. M. (2005). Restorative urban open space: Exploring the spatial configuration of human emotional fulfilment in urban open space. *Landscape Research*, *30*(4), 525-547.

Towers, G. (2003). *Building democracy*. Routledge.

Train, K. E. (2009). *Discrete choice methods with simulation*. Cambridge University Press.

Tzoulas, K., Korpela, K., Venn, S., Yli-Pelkonen, V., Kaźmierczak, A., Niemela, J., & James, P. (2007). Promoting ecosystem and human health in urban areas using

Green Infrastructure: A literature review. *Landscape and urban planning*, *81*(3), 167-178.

Van Oel, C., van Den Berkhof, F., (2013) Consumer preferences in the design of airport passenger areas, *Journal of Environmental Psychology*, 36, 280-290

Vartanian, O., Navarrete, G., Chatterjee, A., Fich, L. B., Leder, H., Modroño, C., ... & Skov, M. (2013). Impact of contour on aesthetic judgments and approach-avoidance decisions in architecture. *Proceedings of the National Academy of Sciences*, *110*(Supplement 2), 10446-10453.

Renn, O., Webler, T., & Wiedemann, P. M. (Eds.). (1995). *Fairness and competence in citizen participation: Evaluating models for environmental discourse* (Vol. 10). Springer Science & Business Media.

Wiedemann, P. M., & Femers, S. (1993). Public participation in waste management decision making: Analysis and management of conflicts. *Journal of Hazardous Materials*, *33*(3), 355-368.

White, Sarah C. 1996. Depoliticising development: The uses and abuses of participation. *Development in Practice*, 6 (1), 6-15.

Willis, K. G., & Corkindale, J. T. (1995). *Environmental valuation: new perspectives*. Cab International.

Windle, J., & Rolfe, J. (2004). Assessing values for estuary protection with choice modelling using different payment mechanisms. *Valuing floodplain development in the Fitzroy Basin Research Report*, (10).

Zwerina, K., Huber, J., & Kuhfeld, W. (1996). A general method for constructing efficient choice designs. *Durham, NC: Fuqua School of Business, Duke University*.

JFK Market [Online image]. (2013). Retrieved February 28, 2015 from http://baltimoreheritage.org/wpcontent/uploads/2013/04/857984_497171953674398_1804952945_o.jpg

JFK Market [Online image]. (2013). Retrieved February 28, 2015 from http://www.baltimoresun.com/entertainment/bal-bs-ae-weekend-rewi-a20101121115816-photo.html

JFK Market [Online images]. (March 2013). Retrieved November 2014, from http://bettercities.net/article/dissolving-border-vacuums-part-4-19923