

THE AESTHETICS OF NATURALISTIC LANDSCAPES IN CIVIC SPACES: A STUDY OF  
PREFERENCE

by

AMANDA ULRICH

B.A., Truman State University, 2010

A THESIS

submitted in partial fulfillment of the requirements for the degree

MASTER OF LANDSCAPE ARCHITECTURE

Department of Landscape Architecture/Regional and Community Planning  
College of Architecture, Planning and Design

KANSAS STATE UNIVERSITY  
Manhattan, Kansas

2010

Approved by:

Major Professor  
Dr. Timothy D. Keane

# **Copyright**

AMANDA M. ULRICH

2010

## Abstract

Naturalistic landscapes have increased in popularity, especially in the landscape architecture profession, due to the push for greener and more sustainable landscape designs in civic spaces. The increase in popularity and resulting use of naturalistic landscapes by landscape architects creates a need to understand users' preferences for naturalistic landscapes. Users need to have moderate to high preference levels for the naturalistic landscape spaces in order for such spaces to be successful. This work identifies and explains civic spaces, characteristics of traditional landscape designs, characteristics and history of naturalistic landscapes, and characteristics and details of previous preference studies that focused on people's preferences for natural areas. This study also identifies current preference levels and background characteristics of respondents, which are used to determine who does and does not prefer naturalistic landscapes in civic spaces and why.

A survey questionnaire targeted toward users of naturalistic landscapes identified opinions, preferences, and statistical data relevant to this study. A total of sixty-one surveys were completed and collected from two separate survey sites. Survey results were used to determine:

1. Preference levels of the respondents.
2. Background characteristics and values of the respondents.
3. Correlations and patterns between respondents' preference levels and their background characteristics.
4. Correlations and patterns between respondents' preference levels and their values and opinions.
5. Differences between the results from the two survey sites.

Survey results and analyses indicate that perceived safety is a major factor that influences preference levels. Background characteristics such as the level of formal education and the participation in classes and seminars that focus on topics relevant to naturalistic landscapes are also significant indicators of preference levels. Another of the indicators is the participation in outdoor activities of all sorts. Along with determining the indicators of preference levels, the survey results were used in the comparison of the results from the two survey locations.

# Table of Contents

List of Figures .....	ix
List of Tables .....	x
CHAPTER 1 - Introduction .....	1
The Importance of Naturalistic Landscapes in Civic Spaces .....	1
Purpose of the Study .....	2
Questions Addressed in the Study .....	3
Components of the Study.....	3
Background Research .....	4
Study Design.....	5
Site Selection .....	5
Survey Questionnaires .....	7
Analysis of Data.....	7
Conclusions and Recommendations .....	8
Organization of the Thesis .....	8
Chapter 2.....	8
Chapter 3.....	8
Chapter 4.....	8
Chapter 5.....	9
CHAPTER 2 - Literature Search - Background .....	10
Civic Open Spaces .....	10
Traditional Landscape Design .....	11
Plant Selection .....	11
Plant Placement.....	13
Management and Maintenance .....	14
Naturalistic Landscape Design .....	16
Plant Selection .....	16
Native Versus Non-native Species.....	16
Habitat Restoration .....	17

Creative Conservation.....	19
Anthropogenic Landscape .....	20
Biodiversity.....	20
Stability .....	21
Aesthetic and Visual Pleasure.....	21
Maximizing Display Length .....	22
Patterns.....	22
Invasiveness in Terms of Biodiversity.....	23
Competition.....	23
Plant Placement.....	23
Substitution .....	24
Diversification of Ground Layer Plantings.....	24
Stylization/abstraction of Native Plant Communities.....	25
Benefits of Naturalistic Landscapes.....	33
Economic Factors.....	33
Environmental Factors .....	34
Physical, Psychological and Social Factors .....	35
Naturalistic Landscapes used as Restorative Environments.....	37
Being Away .....	38
Extent .....	38
Fascination .....	39
Compatibility .....	39
Disadvantages of Naturalistic Landscapes.....	39
Naturalistic Landscape Design's Increase in Popularity.....	40
Sustainability.....	41
Local Character.....	41
Aesthetic Preference .....	42
What are Aesthetic Preferences .....	42
Preference and Human Needs.....	43
Understanding.....	43
Way-finding Material.....	46

Familiarity.....	46
Exploration.....	48
Preference and Effective Functioning.....	49
Preference and Safety .....	49
Preference and the Social and Cultural Context .....	50
Previous Preference Studies.....	52
CHAPTER 3 - Methodology .....	53
Background Research - Literature .....	55
Civic Spaces.....	55
Traditional Landscape Design .....	55
Naturalistic Landscape Design .....	55
Aesthetic Preferences.....	56
Site Selection .....	56
Anita B. Gorman Discovery Center.....	57
Purpose.....	57
Aesthetic Attributes .....	57
People Attending the Site.....	59
Johnson County Transit Center.....	60
Purpose.....	60
Aesthetic Attributes .....	60
People Attending the Site.....	63
Survey Questionnaire.....	63
Survey Administration.....	68
Analysis of Data.....	68
CHAPTER 4 - Results .....	71
Site .....	71
Anita B. Gorman Discovery Center.....	71
Johnson County Transit Center.....	73
Respondents.....	74
Anita B. Gorman Discovery Center.....	74
Summary .....	86

Age.....	86
Place-Types Respondents Grew Up in and Live in .....	86
Landscape Elements in Respondents’ Home Landscapes .....	86
Ideal Landscape Characteristics.....	87
Formal Education and the Participation in Extra Classes and Seminars .....	87
Knowledge of Native Plants, of their Benefits, and of Sustainability .....	87
Participation in Green Activities and Outdoor Activities.....	88
Johnson County Transit Center.....	88
Summary.....	97
Age.....	97
Place-Types Respondents Grew Up in and Live in .....	97
Landscape Elements in Respondents’ Home Landscapes .....	98
Ideal Landscape Characteristics.....	98
Formal Education and the Participation in Extra Classes and Seminars .....	98
Knowledge of Native Plants, of their Benefits, and of Sustainability .....	98
Participation in Green Activities and Outdoor Activities.....	99
CHAPTER 5 - Conclusions and Recommendations.....	100
Patterns Drawn from Survey Responses.....	100
Difference in Overall Preference Levels at the Discovery Center and the Transit Center .	100
Aesthetic Characteristics of the Sites.....	100
Purpose for Attending the Sites .....	101
Levels of Perceived Safety.....	102
Education Levels of the Respondents.....	102
Similarities Between the Results of this Study and the Results of Previous Studies .....	103
Weaknesses in the Questionnaire and the Study’s Design .....	104
Recommendations.....	105
Checklist for the Design of Naturalistic Landscapes .....	105
Plant Selection .....	106
Maintenance.....	106
Elements for Perceived Safety .....	106
Elements for Activities .....	107

Educational Information and Signage.....	108
Recommendations for this Study and Future Studies .....	108
Summary.....	109
References.....	110
Books .....	110
Journals and Papers.....	111
Internet Sources .....	113
Other Sources.....	113
Appendix A - Naturalistic Landscape Design’s Origins.....	114
Appendix B - Mental Maps.....	120
Appendix C - Discovery Center Questionnaire .....	121
Appendix D - Johnson County Transit Center Questionnaire .....	127
Appendix E - Results from the Anita B. Gorman Discovery Center Questionnaire .....	132
Appendix F - Results from the Johnson County Transit Center Questionnaire .....	136
Appendix G - Checklist .....	141
Plant Selection .....	141
Maintenance.....	141
Elements for Perceived Safety .....	141
Elements for Activities .....	141
Educational Information and Signage.....	142

## List of Figures

Figure 1.1 Study Diagram 1 – Illustration of the Study Components .....	4
Figure 1.2 Entrance to the Anita B. Gorman Discovery Center (photo taken by author) .....	6
Figure 1.3 Entrance to the Johnson County Transit Center (photo taken by author) .....	7
Figure 2.1 Geometric Evergreen Hedge with Colorful Annual Plantings (photo taken by author) .....	14
Figure 2.2 Natural Growth of Matured Trees with Manicured Turf and Hedges (photo taken by author).....	15
Figure 2.3 Mixture of Textures and Colors in a Naturalistic Landscape (photo taken by author)	22
Figure 2.4 Tall Grass Prairie (photo taken by author) .....	25
Figure 2.5 Plant Community used as an Infiltration Zone (photo taken by author) .....	26
Figure 2.6 Naturalistic Landscape Illustrating a Continuous Sheet of Mainly Grasses (photo taken by author) .....	28
Figure 2.7 Mixture of Coarse and finer Textured Plants (photo taken by author).....	32
Figure 2.8 Yellow Forbs (photo taken by author).....	32
Figure 2.9 Way-finding and Informational Signage (photo taken by author) .....	46
Figure 3.1 Study Diagram 2 – Illustration of the Methodology .....	54
Figure 3.2 Anita B. Gorman Discovery Center Context Map (Photo from Google Maps, edited by author) .....	58
Figure 3.3 Bioswale in the Parking Lot of the Discovery Center (photo taken by author) .....	59
Figure 3.4 Prairie Landscape at the Discovery Center (photo taken by author).....	59
Figure 3.5 Johnson County Transit Center Context Map (Photo from Google Maps, edited by author) .....	61
Figure 3.6 Buffer at the Transit Center (photo taken by author) .....	62
Figure 3.7 Prairie Landscape at the Transit Center (photo taken by author).....	62
Figure 3.8 Building Entrance at the Transit Center (photo taken by author) .....	63

## List of Tables

Table 3.1 Coding Description .....	69
Table 4.1 Level of Overall Preference, Beauty, Naturalness, Order, Color and Safety for Both Naturalistic Landscapes (Discovery Center) .....	72
Table 4.2 Level of Perceived Safety and Corresponding Preferences for Both Naturalistic Landscapes and How They Relate to Each Other (Discovery Center).....	72
Table 4.3 Level of Overall Preference, Beauty, Naturalness, Order, Color and Safety for the Naturalistic Landscape (Transit Center) .....	73
Table 4.4 Level of Perceived Safety and Corresponding Preferences for the Naturalistic Landscape and How They Relate to Each Other (Transit Center).....	74
Table 4.5 Age Ranges and Corresponding Preferences for the Parking Lot Landscape and How They Relate to Each Other (Discovery Center) .....	75
Table 4.6 Age Ranges and Corresponding Preferences for the Native Prairie Landscape and How They Relate to Each Other (Discovery Center) .....	75
Table 4.7 Place-Type where Respondents Grew Up and Corresponding Preferences for the Parking Lot Landscape and How They Relate to Each Other (Discovery Center).....	76
Table 4.8 Place-Type where Respondents Grew Up and Corresponding Preferences for the Native Prairie Landscape and How They Relate to Each Other (Discovery Center) .....	76
Table 4.9 Place-Type where Respondents Live and Corresponding Preferences for the Parking Lot Landscape and How They Relate to Each Other (Discovery Center) .....	77
Table 4.10 Place-Type where Respondents Live and Corresponding Preferences for the Native Prairie Landscape and How They Relate to Each Other (Discovery Center).....	77
Table 4.11 Significance of the Existing Landscape Elements and Corresponding Preferences for Both Naturalistic Landscapes (Discovery Center).....	79
Table 4.12 Significance of the Ideal Landscape Characteristics and Corresponding Preferences for Both Naturalistic Landscapes (Discovery Center) .....	81
Table 4.13 Amount of Formal Education and Corresponding Preferences for Both Naturalistic Landscapes and How They Relate to Each Other (Discovery Center).....	82

Table 4.14 Extra Classes and Seminars and Corresponding Preferences for Both Naturalistic Landscapes and How They Relate to Each Other (Discovery Center).....	83
Table 4.15 Native Plant Knowledge and Corresponding Preferences for Both Naturalistic Landscapes and How They Relate to Each Other (Discovery Center).....	83
Table 4.16 Benefits of Native Plants and Corresponding Preferences for Both Naturalistic Landscapes and How They Relate to Each Other (Discovery Center).....	84
Table 4.17 Knowledge of Sustainability and Corresponding Preferences for Both Naturalistic Landscapes and How They Relate to Each Other (Discovery Center).....	85
Table 4.18 Participation in Green Activities (Recycle, But recycled Products, Buy Local Products, But Organic Products) and Corresponding Preferences for Both Naturalistic Landscapes and How They Relate to Each Other (Discovery Center).....	85
Table 4.19 Participation in Outdoor Activities and Corresponding Preferences for Both Naturalistic Landscapes and How They Relate to Each Other (Discovery Center) .....	86
Table 4.20 Age Ranges and Corresponding Preferences for the Naturalistic Landscape and How They Relate to Each Other (Transit Center) .....	89
Table 4.21 Place-Type where Respondents Grew Up and Corresponding Preferences for the Naturalistic Landscape and How They Relate to Each Other (Transit Center).....	89
Table 4.22 Place-Type where Respondents Live and Corresponding Preferences for the Naturalistic Landscape and How They Relate to Each Other (Transit Center).....	90
Table 4.23 Significance of Existing Landscape Elements and Corresponding Preferences for the Naturalistic Landscape (Transit Center) .....	91
Table 4.24 Significance of Ideal Landscape Characteristics and Corresponding Preferences for the Naturalistic Landscape (Transit Center) .....	92
Table 4.25 Amount of Formal Education and Corresponding Preferences for the Naturalistic Landscape and How They Relate to Each Other (Transit Center).....	93
Table 4.26 Extra Classes and Seminars and Corresponding Preferences for the Naturalistic Landscape and How They Relate to Each Other (Transit Center).....	94
Table 4.27 Native Plant Knowledge and Correlating Preferences for the Naturalistic Landscape and How They Relate to Each Other (Transit Center).....	95
Table 4.28 Knowledge of Benefits of Native Plants and Correlating Preferences for the Naturalistic Landscape and Hoe They Relate to Each Other (Transit Center).....	95

Table 4.29 Knowledge of Sustainability and Corresponding Preferences for the Naturalistic Landscape and How They Relate to Each Other (Transit Center).....	96
Table 4.30 Participation in Green Activities (Recycle, Buy Recycled Products, Buy Local Products, and Buy Organic Products) and Corresponding Preferences for the Naturalistic Landscape and How They Relate to Each Other (Transit Center).....	96
Table 4.31 Participation in Outdoor Activities and Corresponding Preferences for the Naturalistic Landscape and How They Relate to Each Other (Transit Center).....	97

# **CHAPTER 1 - Introduction**

This thesis identified and analyzed factors that have the ability to influence respondents' preference levels for naturalistic landscapes in civic spaces in the Mid-west region of the United States.

## **The Importance of Naturalistic Landscapes in Civic Spaces**

In today's society, environmental protection and greener actions, or actions that are environmentally friendly, are becoming mainstream. Elements like open spaces, buildings and parking lots are being designed to be more sustainable. Sustainability deals with actions and elements that have the ability to sustain themselves over the long-term with little human involvement and resource use. Civic open spaces, or open spaces in metropolitan and peri-urban areas, are one of the elements getting a green facelift. Civic open spaces, as defined by this study, are primarily composed of well-manicured turf and traditional landscape plantings. Civic open spaces are important in urban locations because they provide needed green space and because many people who live in urban areas only have contact with nature, or natural elements when using civic open spaces. People who live within the urban core and peri-urban area use civic open spaces during work, for leisure, and for organized activities. Manicured turf and traditional plantings are being replaced with native plants and naturalistic planting design for the green facelift and the creation of more sustainable space. Leading the modern transformation process from traditional landscape design to naturalistic landscape design is the field of Landscape Architecture (LA). The LA field contains experts on native plants, naturalistic landscape design and the many benefits of green design.

The benefits of naturalistic landscape design include aspects that are good for people and the environment. The inclusion of naturalistic landscapes in civic open spaces provides education about the history of the region and provides the city with a sense of local character. Naturalistic landscapes provide education through the use of posted signage and educational activities on how using native plants will create more sustainable and environmentally friendly spaces.

Naturalistic landscapes provide users with a space that has local character and historical value by mimicking the natural landscape of the region. In the Mid-west, native tall-grass prairie

is what creates the local character. The Mid-west is the region where the author, a landscape architecture student, grew up in and is most familiar with. Familiarity with the character of the native tall-grass prairie, a background in landscape architecture and the want to lead cities into a more sustainable future led to my interest in this topic.

No matter the benefits of naturalistic landscapes for people and the environment, if the people interacting with naturalistic landscapes in civic spaces do not visually prefer them, the naturalistic landscape will not be understood. Understanding a space involves being able to look at a space and determine the purpose for the space and the elements within it. If people do not prefer naturalistic landscapes, those landscapes will also not be well received or implemented into civic open spaces.

### **Purpose of the Study**

Due to the positive effects of naturalistic landscapes and their increase in popularity and implementation in civic spaces, it is important that people interacting with those landscapes have at least a moderate aesthetic preference for them. If the people interacting with naturalistic landscapes have low aesthetic preferences for the spaces, the naturalistic landscape will be unsuccessful. Unsuccessful naturalistic spaces are seldom used by people and often fall into disorder and disrepair. If naturalistic landscape spaces fail, they will likely be returned to traditionally designed landscapes that have less benefit to people and the environment. To prevent naturalistic landscape designs from being unsuccessful, human interaction with naturalistic landscapes in civic spaces should be studied.

Studying the people who interact with naturalistic landscapes entails determining why people do and do not prefer spaces. Along with determining preference levels of those who interact with naturalistic landscapes, their backgrounds, their knowledge levels for native plants, their knowledge of sustainability, their opinions on important landscape characteristics and their actions are important. Background characteristics include elements pertaining to information about respondents such as age, location of residence, and occupation. Actions include not only the respondents' participation in outdoor activities, but actions that pertain to recycling and other behaviors that provide insight into respondents' values. Background characteristics, knowledge levels, and actions of people are compared to their levels of aesthetic preference for naturalistic landscapes. Comparisons are used to determine what influences aesthetic preference levels and

in identifying which people have which levels of preference. Once the people who do and do not prefer naturalistic landscapes and the factors influencing those preferences are understood, efforts can be taken to create spaces that are more visually preferred and in turn, more successful. Successful spaces are those that are enjoyed by the people who use them, are understood and are not allowed to fall into disrepair.

### **Questions Addressed in the Study**

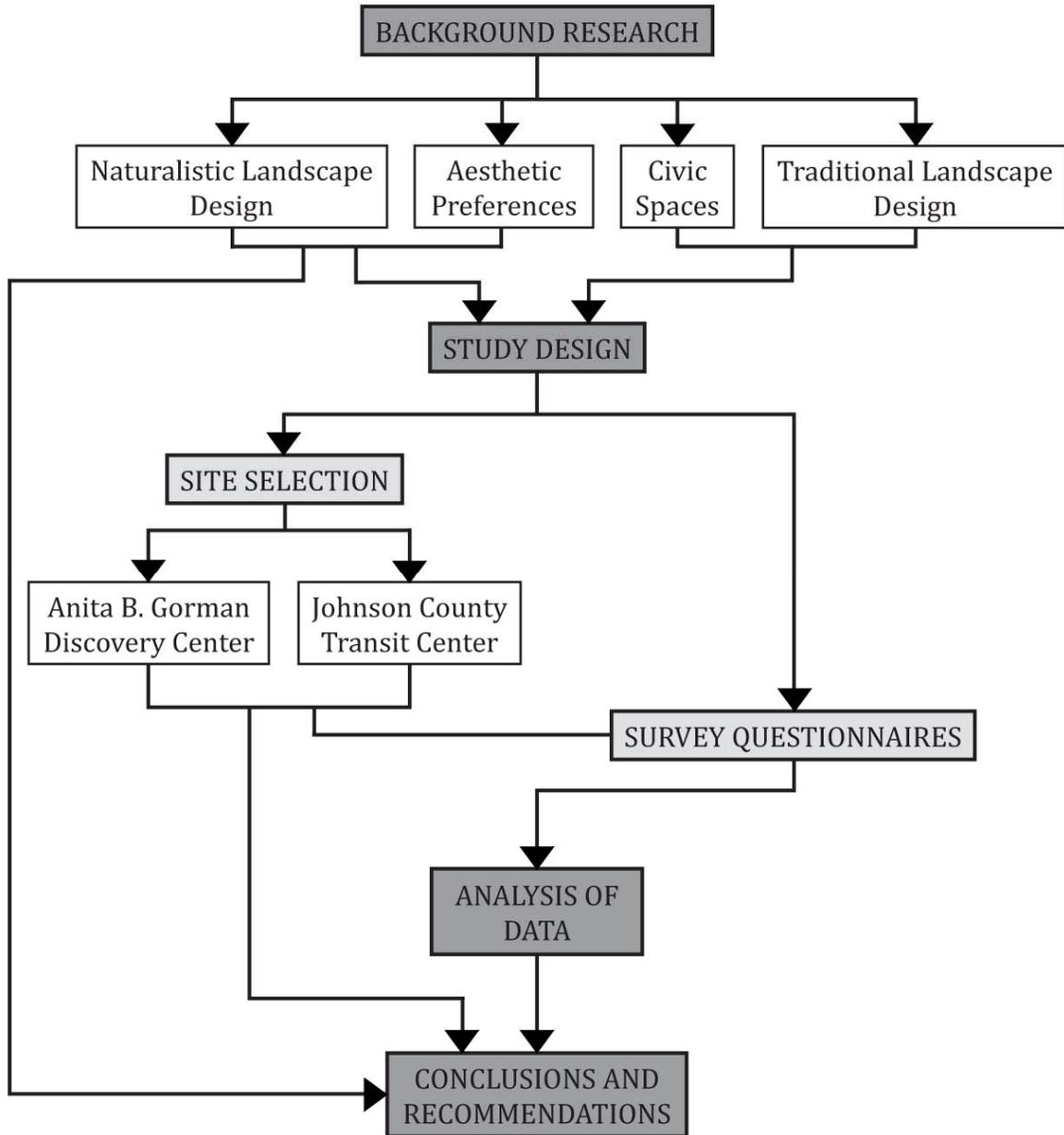
The questions posed here pertain to traditional landscape design, naturalistic landscape design, aesthetic preferences, and the people that use naturalistic landscapes. The questions are the basis for the study and are used to develop the components of the study.

- What are civic spaces?
- What is traditional landscape design?
- What is naturalistic landscape design?
- What are aesthetic preferences for naturalistic landscapes and what have previous preference studies in topics related to naturalistic landscapes found that are relevant to the this study?
- What are the backgrounds and knowledge levels of the people that visit naturalistic landscapes and what are their preferences for such landscapes?
- Do background characteristics and knowledge levels influence aesthetic preferences for naturalistic landscapes?

### **Components of the Study**

The components of this study are comprised of four major sections (See Figure 1.1). Section one is Background Research, which is developed using written sources such as books, journals, and the previous preference studies of experts in fields relevant to naturalistic landscape design. Background research is used to develop the second section, which is Study Design. Study Design is comprised of Site Selection and Survey Questionnaires. The Survey Questionnaires provide the data that is to be analyzed, which is the third major section of the study. The forth-major section is Conclusions and Recommendations, which is influenced by the Analysis of Data, Site Selection, and Background Research (see Figure 1.1).

**Figure 1.1 Study Diagram 1 – Illustration of the Study Components**



***Background Research***

Information from written sources was obtained from books, journals, and the Internet. The writings of professionals on traditional landscape design were very important in developing a solid understanding of what makes up traditional landscape design. Writings of professionals

were also used to determine the characteristics of civic spaces. The writings of professionals were also used to develop an understanding of naturalistic landscape design characteristics. Previous studies were a main source of information on people's preferences and study design.

### ***Study Design***

The design of the study is broken down into Site Selection and Survey Questionnaires. Site selection took place in the Mid-west region of the United States, and resulted in the choice of two sites for the administration of the survey questionnaires. The characteristics of the two sites were used in conjunction with background research to develop the survey questionnaires.

#### ***Site Selection***

The two study sites are located in the Mid-west where the native tall-grass prairie is the model for naturalistic landscape design. The Anita B. Gorman Conservation Discovery Center opened April, 2002, and is located in Kansas City, Missouri (see Figure 1.2). The Discovery Center is a part of the Missouri Department of Conservation and the Missouri Department of Natural Resources. The Discovery Center “focuses its educational programs on helping urban children and adults appreciate the bounty and beauty of nature, and learn outdoor skills such as hiking, camping, wildlife viewing and growing native plants” (mdconline Discovery Center). The Discovery Center is located on ten acres of gardens, wetlands, and walkways. Within the ten acres are a constructed naturalistic native prairie landscape of less than one acre and a constructed naturalistic landscape located within the medians of the parking lot. Both naturalistic landscapes were implemented in 2001 and went through extensive plant revisions from 2004 to 2008 (Robert Fluchel, pers. comm.). The Discovery Center uses these naturalistic demonstration landscapes to “teach urban citizens how valuable and necessary nature is to the city and to the people who live there” (mdconline Discovery Center).

**Figure 1.2 Entrance to the Anita B. Gorman Discovery Center** (photo taken by author)



The Johnson County Transit Center, dedicated in 2001, is located in Olathe, Kansas, and is the operations facility for the county’s mass transit system (see Figure 1.3). The large amount of non-permeable surfaces, such as pavement and buildings, at the Transit Center makes it a good location for a stormwater infiltration study. Because it is a good location for an infiltration study, that Transit Center is participating in the Johnson County Stormwater Management Program that began in the 1990s. In the summer of 2005 the infiltration study began at the Transit Center by measuring stormwater runoff from the traditional landscape design. After the initial measures were taken, implementation of a naturalistic native prairie landscape began in Spring 2007 by replacing the turf with native grasses and forbs. The research focus at this site is to “study the effects of stormwater runoff” (Johnson County Stormwater Management Program) (Johnson County Stormwater Management Program; theJO).

**Figure 1.3 Entrance to the Johnson County Transit Center** (photo taken by author)



### *Survey Questionnaires*

The survey questionnaires used in this study were developed to obtain information in three categories (see Appendix C and D for the full questionnaires). The first category sought to determine respondents' preferences for naturalistic landscape spaces and their level of perceived safety. Category two was used to understand the amount of knowledge the respondents possess for native plants and the environmental benefits those native plants provide. The last category was to determine the background characteristics of the respondents. Some of these characteristics included age, location of residence when growing up, location of residence today, level of formal education, participation in classes and seminars with topics relevant to naturalistic landscapes, aspects of the respondents' landscapes they find most important and the respondents' participation in outdoor activities. Results from the questionnaires were analyzed to determine which factors, if any, of the respondents' backgrounds and opinions correlated with their preference levels (see Ch. 4). The questionnaires were administered at two sites in the Kansas City urban and peri-urban area.

### *Analysis of Data*

Data gathered from the administration of the survey questionnaires was analyzed in this section. The data was used to identify patterns and correlations between the overall preference

levels and their background characteristics, values, and activities. The analyses results were then used to provide conclusions and recommendations.

### ***Conclusions and Recommendations***

Conclusions and recommendations were developed using the analyses findings in conjunction with the characteristics of the study's sites and with the information gathered from the background research. The site characteristics were used to attempt to explain the reasons for some of the findings and information from the background research was used to identify patterns between this study's findings and the findings of previous studies.

## **Organization of the Thesis**

### ***Chapter 2***

Chapter two contains background information gathered from written and on-line sources. Content is organized in sections that include civic spaces, traditional landscape design, naturalistic landscape design and aesthetic preferences. The content strives to create an understanding of what civic spaces are, the characteristics of traditional landscape design, the characteristics of naturalistic landscape design and the many aspects of aesthetic preferences.

### ***Chapter 3***

Chapter three is the methodology chapter, which describes the methods used for this study. It is composed of five sub-sections on the subjects of research, site selection, questionnaires, administration of the questionnaires, and coding and analysis.

### ***Chapter 4***

Chapter four focuses on the results of the study. For this study, the results are derived from survey questionnaires. Chapter four focuses on presenting the data obtained from the questionnaires and then analyzing the data. The analyzed information is presented using text and tables and organized into two sub-sections, which are 'Site' and 'Respondents'.

## *Chapter 5*

Chapter five uses the information analyzed in Chapter 4 and identifies patterns drawn from the results of Chapter 4, it then compares the findings to those of previous preference studies, seen in Chapter 2. Chapter 5 also identifies areas of weakness in the questionnaire and in the study's overall design. The chapter is composed of three sections, which include 'Patterns Drawn from the Results', 'Weaknesses in the Questionnaire and the Study's Design', and 'Recommendations'.

## **CHAPTER 2 - Literature Search - Background**

To inform the various aspects of this study, background research in the areas of civic spaces, traditional landscape design, naturalistic landscape design, and people's preferences was conducted. Civic spaces, or public spaces, were defined through the use of Rachel and Stephen Kaplan's book *The Experience of Nature* (Kaplan and Kaplan, 1995), and the work of Clark and Stankey (Clark and Stankey, 1979). The characteristics and design process of traditional landscape design were illustrated by Darrel Morrison in his essay, "For ecological landscape and planting design – site planning and spatial design," in the book, *The Dynamic Landscape* (Dunnett and Hitchmough, 2008), which is a compilation of essays written by experts in the field of landscape design and architecture, and covers the range of ideas used in this study. Naturalistic landscape design's characteristics, the reasons behind its increase in popularity and how it functions in today's society are illustrated primarily using the works of the many experts in *The Dynamic Landscape* (Dunnett and Hitchmough, 2008), and the works of Rachel and Stephen Kaplan (Kaplan, Kaplan, and Ryan 1998), and the design principles of Gustaaf van der Hoven (van der Hoven, 1977). The works of many other experts were also consulted, such as Woudstra (2008), Clayton (1997), Thompson (2000), and Barwell (1985). People's aesthetic or visual preferences were defined and previous studies in the field of preferences for the natural environment were described using the ideas and knowledge of many experts, particularly Rachel and Stephen Kaplan. The Kaplans have completed decades of research on people's aesthetic preference for naturalistic landscapes and two of their books, plus many of their papers were used as resources.

### **Civic Open Spaces**

This study characterizes civic spaces as being an urban and peri-urban environment. Civic open spaces are typically developed using what this study terms 'Traditional Landscape Design'. Mostly exotic plant species are used in the traditional landscape designs and are managed to maintain a manicured appearance. For this study, civic open spaces are characterized as ranging in size from small median landscapes and rain gardens, of less than a block in size, to spaces of multiple acres such as large city parks. People within and around the space create many

of the sounds heard within civic open spaces. The sounds are produced not only by the people themselves, but also by the transportation they use when traveling to the space, as in personal vehicles and mass transit. Natural sights seen in civic open spaces involve views of elements such as trees, shrubs, flowers and grass. Sights also involve the view of other people interacting with the open space and of people passing along the space (Clark and Stankey, 1979; Kaplan and Kaplan, 1998).

Opportunities for individuals and groups to undertake activities and affiliations are readily available in civic open spaces. The opportunities provided are both active and passive. Active opportunities range from relaxing during a break from work to participating in competitive and spectator sports. Passive opportunities involve activities such as viewing the space from a distance or from a window (Clark and Stankey, 1979) (Kaplan and Kaplan 1998, 151). Some examples of civic open spaces (as used in this study) in the Kansas City area are Loose Park, Shawnee Mission Park, Cancer Survivors Park and even the 12<sup>th</sup> Street Rain gardens.

### **Traditional Landscape Design**

Darrel Morrison (2008) described “traditional landscape design” in his essay “A methodology for ecological landscape and planting design – site planning and spatial design” published in *The Dynamic Landscape*, edited by Dunnett and Hitchmough. Morrison explained that traditional landscape design is composed of plant selection, plant placement and a strict maintenance and management regime. Through understanding traditional landscape design one can more fully identify the differences between traditional and naturalistic landscape design types (Morrison 2008, 117 in Dunnett and Hitchmough (eds.)).

#### ***Plant Selection***

Plant selection in traditional landscape design follows trends that have been developed over many years. Plants are selected for their aesthetic and functional qualities, and for their fit into a large geographical area, which is based upon zonal qualifications (Morrison 2008, 117-118 in Dunnett and Hitchmough (eds.)).

Morrison explained that evergreen trees and shrubs, and those that possess showy flowers, fruit, and autumn color are often selected and widely used across geographic regions where the zone requirements are similar. The most common selection of groundcover in

traditionally designed landscapes is turf. It is estimated to occupy over 30 million acres in the United States, most of which are covered with exotic or hybridized species. In order to provide the dark-green carpet-like mat that has become the model in traditional landscape design, supplemental watering, fertilizing, and pesticides are needed. Due to the lack of seasonal color provided by turf, seasonal bulbs and annuals are selected and planted to provide supplemental color. In many commercial locations, the seasonal plants and bulbs are dug up and replaced several times a year to guarantee continuous color. Morrison developed a set of plant selection criteria that determines which plants to use in conjunction with turf (Morrison 2008, 117-118 in Dunnett and Hitchmough (eds.)).

- *Aesthetic characteristics* – Plants are selected based upon form, texture and seasonal color characteristics (Morrison 2008, 117 in Dunnett and Hitchmough (eds.)).
- *Functional capabilities* – The plant’s usefulness at providing shade, a wind break, visual screening or framing, and the control of erosion and sedimentation (Morrison 2008, 117 in Dunnett and Hitchmough (eds.)).
- *Environmental tolerance* – The plant is selected based upon its hardiness, sun, shade and wind tolerance, and increasingly, the ability to withstand the effects of soil, water and air pollution. Until recently, water requirements were given only secondary consideration, because of the relative ease and low cost of providing supplemental water to plants needing more water than might occur naturally in a region, in the form of precipitation (Morrison 2008, 117 in Dunnett and Hitchmough (eds.)).
- *Commercial availability* – the availability of a plant is a prerequisite for any particular plant species being incorporated into a designed landscape. The common practice is for large nurseries to mass-produce hundreds of plants of a limited number of well known, well marketed and ‘reliable’ species, often because of wide environmental amplitude and a high level of efficiency for the nursery. The abundantly produced plants include a mix of native and exotic species, as well as hybrids and cultivars. It is unusual for growers to differentiate between these plants on the basis of origin, or to provide such information to

buyers in catalogues or at nursery sales areas (Morrison 2008, 117 in Dunnett and Hitchmough (eds.)).

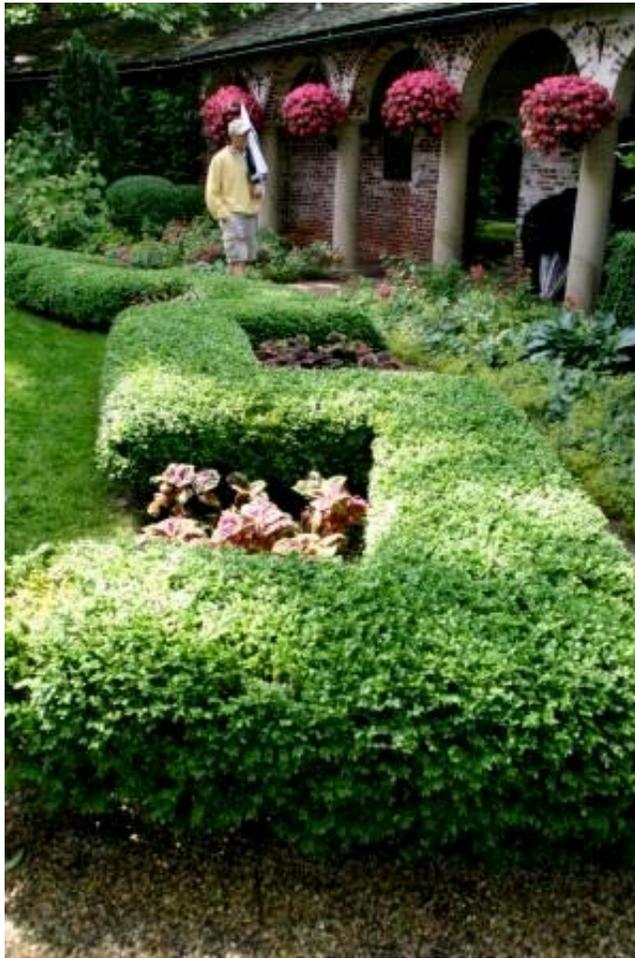
Placement of selected plant species is another identifying characteristic of traditional landscape design.

### ***Plant Placement***

The placement strategies and patterns of plants in traditional landscape designs are characteristics that set traditional landscape design apart from naturalistic landscape design. In traditional landscape design plant placement patterns are much less complex than in naturalistic landscape design (Morrison 2008, 118 in Dunnett and Hitchmough (eds.)).

Geometric planting patterns are typical, and often reflect the geometry of the building and surrounding urban setting. Plants are used as architectural forms for creating outdoor spaces and three-dimensional designs (see Figure 2.1) (Morrison 2008, 118 in Dunnett and Hitchmough (eds.)).

**Figure 2.1 Geometric Evergreen Hedge with Colorful Annual Plantings** (photo taken by author)



Existing trees are typically preserved and incorporated into the designed landscape, but the simplification of the landscape around them is standard. Naturally occurring understory and ground layers are removed from beneath the trees and replaced with turf, mulched beds or ground cover consisting of a single species. A strict management and maintenance regime for traditional landscapes must exist to maintain the turf, planting beds and ground cover, (Morrison 2008, 118 in Dunnett and Hitchmough (eds.)).

### ***Management and Maintenance***

Management and maintenance regimes begin once the plant species are selected and installed into the designed space. Plant maintenance is a defining characteristic of traditional landscapes and focuses on keeping the design mostly unchanged, except for small amounts of

managed growth in shrub and tree species, until the plants have reached maturity (Morrison 2008, 118 in Dunnett and Hitchmough (eds.)).

Natural growth of most trees is permitted while surrounding shrubs are trimmed to provide a compact and more architectural form, as in the creation of hedges (see Figure 2.2). Turf is maintained as to not reach a height greater than approximately two inches. Fertilizer and herbicides are liberally applied to create a mat of green growth that is free of invading plant species. Species composition of planting beds is also maintained through the removal of invading plant species, otherwise known as weeds (Morrison 2008, 118 in Dunnett and Hitchmough (eds.)).

**Figure 2.2 Natural Growth of Matured Trees with Manicured Turf and Hedges** (photo taken by author)



The combined effect of Morrison’s plant selection criteria, plant placement criteria and maintenance and management regime results in “an ordered park-like appearance with smooth, deep-green lawn interspersed with predominantly dense, dark-green shrubs planted as hedges, blocks or masses; and symmetrically shaped specimen trees planted either as individuals or in rows or in ‘informal’ groupings, often of a single species and size” (Morrison 2008, 118 in Dunnett and Hitchmough (eds.)). The changes in flowers and foliage color, and the seasonal changes in bulbs and annual displays are sometimes the only noticeable changes. The lack of change in traditional landscape design is in direct opposition to the large amount of change seen in naturalistic landscape design (Morrison 2008, 118 in Dunnett and Hitchmough (eds.)).

## **Naturalistic Landscape Design**

Naturalistic landscape design focuses on ecologically based ideas and practices. Plant selection is based upon using native versus non-native plants, biodiversity and plant competition. Within the consideration of native versus non-native plant usage there are three areas of thought: habitat restoration, creative conservation and anthropogenic landscapes. Biodiversity is composed of the ideas of stability, aesthetic and visual pleasure, organism support, filling available niches, maximizing display length, patterns and invasiveness in terms of biodiversity. The placement of selected plants is determined using the ideas of substitution, diversification of ground layer plantings and the stylization/abstraction of native plant communities. To further understand naturalistic landscapes it is important to identify the reasons for its increase in popularity, which has been attributed to sustainability and increasing the local character of an area (Dunnnett and Hitchmough (eds.), 2008).

### ***Plant Selection***

#### ***Native Versus Non-native Species***

The question of the use of native versus non-native species, or the combination of the two, sparks a debate in the design of naturalistic landscapes among designers and interested parties. The sole use of native plants in naturalistic landscape design is supported by some experts due to the probability of high levels of habitat establishment. Using native species in the creation of a naturalistic landscape has been shown to support a wider range of organisms, especially birds, insects, and fungi. Non-native plant species provide different nutrients and habitats than do the native species in the area, which creates an environment that may not support local organisms (Dunnnett and Hitchmough (eds.), 2008; Dunnnett, 2008 in Dunnnett and Hitchmough (eds.)).

Many experts in the fields of landscape architecture, biology and others relevant to naturalistic landscapes provide evidence for the use of both native and non-native plants in combination. Burrell stated “there is no point in using a native (specie) if it cannot perpetuate itself” and “non-natives can do much to expand the season for wildlife...But I do try to limit using non-native, berry-producing plants as these can be carried by birds, and some of our worst invasive species have been berry bearing shrubs” (Burrell, 2001). It is incorrect to stereotype all non-native species as invasive and all natives as non-invasive. Nigel Dunnnett and James

Hitchmough stated that many of the non-native species used in a naturalistic landscape design have likely been grown for many years, and in some instances centuries, in urban parks and gardens leading to the naturalization of the non-native species (Dunnett and Hitchmough (eds.), 2008; Kingsbury, 2008 in Dunnett and Hitchmough (eds.); Hitchmough, 2008 in Dunnett and Hitchmough (eds.)).

Some theories state that a naturalistic landscape may be composed solely of native species, while others state that a combination of native and non-native species may be used as long as non-native species fit functionally into the space. Noel Kingsbury (2008) explained that there are three broad strands of naturalistic landscape design approaches that help to clarify the native versus non-native species debate. Kingsbury's three approaches include habitat restoration, creative conservation and anthropogenic landscape (Kingsbury, 2008 in Dunnett and Hitchmough (eds.)).

### ***Habitat Restoration***

Habitat restoration follows rigid assumptions on a path to conservation rather than on a path to an aesthetically creative end. Habitat restoration adheres to a philosophy where the species that were present before humans destroyed them need to be re-established. Aesthetics are an after thought, and are believed to work themselves out. Followers of habitat restoration assume that with moral authority on their side, there is no need to consider how the design impacts the lives of the public, both aesthetically and socially. The details, pros and cons of habitat restoration follow (Dunnett and Hitchmough (eds.), 2008; Kingsbury, 2008 in Dunnett and Hitchmough (eds.)):

- Habitat Restoration identifies stereotype plant communities to be restored and used, almost exclusively, plants native to a state or the region involved. This form of restoration and native plant usage is most stressed in the United States (Kingsbury, 2008 in Dunnett and Hitchmough (eds.)).
- Previously occupying species are reestablished, either by the sowing of seed or transplanting of seedlings and small plants. Seed is preferably collected from local, extant populations. Reinforcing biodiversity, and not adding species or sub-populations that did not once exist on the site is of utmost importance to the

restoration of a habitat (Dunnett and Hitchmough (eds.), 2008; Kingsbury, 2008 in Dunnett and Hitchmough (eds.)).

- Habitat restoration is most frequently associated with parcels of land that retains some semblance of natural character and is frequently used to develop connections that link fragments of existing natural spaces. Through the creation of linked natural spaces, the migration of plants, animals, and their genes help to create an opportunity for the development of viable plant communities (Dunnett and Hitchmough (eds.), 2008).
- The public can receive valuable educational experiences and important psychological linkages among the restored urban areas and the surrounding rural landscapes, no matter the size of the restored urban site. Sizes of the restored urban landscapes may range from small pocket parks and private gardens to large parks and corporate campuses (Thompson, 2000; Kingsbury, 2008 in Dunnett and Hitchmough (eds.)).
- Development of social and political tensions at times result when habitat restoration sites are located in highly urbanized areas (Dunnett and Hitchmough (eds.), 2008).
- The functional needs of urban inhabitants, as in locations for playing sports, throwing Frisbees and picnicking, are rarely met when purely native vegetation is used in the creation of the site (Dunnett and Hitchmough (eds.), 2008).
- Habitat restoration sites may produce other problems when undertaken on a highly urbanized site. The present timescale and the highly modified conditions of the site are generally very different than in the past and could undermine the approach of habitat restoration. The idea that habitat restoration may be undermined by some urban environments is supported by Noel Kingsbury (2008), who stated that, “the natural environment of urban areas is often so altered and degraded, there is arguably little rationale behind being too fixed in our notions of what vegetation community is appropriate for particular locations” (Dunnett and Hitchmough (eds.), 2008; Kingsbury, 2008 in Dunnett and Hitchmough (eds.)).
- The increased availability of native plant seed to both professionals and amateurs and the increase in commercial marketing may result in inappropriate species

mixtures and techniques throughout a large geographic region (Kingsbury, 2008 in Dunnett and Hitchmough (eds.)).

The next of Kingsbury's approaches follows a less rigidly defined process than habitat restoration and is called creative conservation.

### ***Creative Conservation***

Creative conservation follows a philosophy that understands the impossibility of knowing exactly which species occupied a site in the past. Known historic plant compositions, provide a snap shot into the past of a single point in time. Given that only snapshots of the past can be known, and that the preceding and subsequent time is unknown, creative conservation is highly conjectural. The key principles, pros and cons of creative conservation follow (Dunnett and Hitchmough (eds.), 2008):

- Species chosen must fit ecologically into where they are to be grown and function as a community, not as individual species. The plant community has to be designed as an entity and allowed to change over time. Change in the community is managed through the use of ecologically and horticulturally informed practices (Dunnett and Hitchmough (eds.), 2008; Morrison, 2008 in Dunnett and Hitchmough (eds.)).
- Species selected for creative conservation sites are associated with similar environmental conditions as those that prevail on the designed site. Individual species are obtained through the purchase of seed or plant from native plant nurseries located in the same geographical region as the site being designed. The genes of more local populations are better fitted to the changed site conditions and natural selection will sort out any problems (Dunnett and Hitchmough (eds.), 2008).
- The process of creative conservation uses key principles to create a future product that is undefined and the nature of which is shaped by the combination of site characteristics and management practices (Dunnett and Hitchmough (eds.), 2008).

The last of Kingsbury's approaches is the most tolerant of the use of non-native species when compared to habitat restoration.

### ***Anthropogenic Landscape***

Anthropogenic landscape involves an approach where human intervention is used to create nature-like plant communities with species that may not occur naturally on the site. Given the changed conditions of urban sites, these plant communities may be well fitted to the site. The key processes, pros and cons of anthropogenic landscapes follow (Dunnett and Hitchmough, 2008):

- Anthropogenic landscapes are based on the same key processes as habitat restoration and creative conservation, except that anthropogenic landscapes are obscured by the use of species that are not native to the site (Dunnett and Hitchmough, 2008).
- In opposition to habitat restoration and creative conservation, anthropogenic landscape design is strongly influenced by aesthetic processes. The strong focus on aesthetic processes aids in the creation of a site that has the possibility of being more accepted by the public (Dunnett and Hitchmough, 2008).
- Cities and citizens that use anthropogenic landscape processes are not determined to recreate the world as it once was. Instead, they are about transforming it and shaping new realities for the new conditions that exist (Dunnett and Hitchmough, 2008).
- The processes used in Anthropogenic landscapes are seen as an abomination by those who practice habitat restoration and creative conservation, due to the fact that it creates plant communities that never before existed, and that can not be found in existing natural areas (Dunnett and Hitchmough, 2008).

The use of native plants, also in combination with non-natives, when creating naturalistic landscape provides benefits and disadvantages, as seen in the previous text, to the people who use the site and to the environment as a whole.

### ***Biodiversity***

Nigel Dunnett (2008) explained that biodiversity is a main characteristic of naturalistic landscape design due to an increased ability for the more diverse plant community to withstand environmental change, its aesthetic and visual pleasure, its support for other organisms, and its ability to fill available niches and maximize display length. Noel Kingsbury (2008) stated, in his

essay “Contemporary overview of naturalistic planting design,” in *The Dynamic Landscape* that “biodiversity and zones of transition are a vital part of a genuinely living landscape” (Kingsbury 2008, 64 Dunnett and Hitchmough (eds.)). To maintain biodiversity in plant communities in the long-term, patterns should be followed in the initial installation and plants should be understood as being either invasive or non-invasive (Dunnett, 2008 in Dunnett and Hitchmough (eds.)).

### ***Stability***

Diverse plant communities are more stable and resistant to external change than plant communities with less diversity. Dunnett (2008), in his essay “The dynamic nature of plant communities,” in *The Dynamic Landscape*, used K.S. McCann’s two theoretical arguments to illustrate the stability of diverse plant communities (Dunnett, 2008 in Dunnett and Hitchmough (eds.)).

The first theory is based upon the assumption that all species react differently to environmental changes and variations. Therefore, a large number of different species may result in a large number of different reactions to those changes and variations. Environmental change may, in turn, not affect the overall community because of the large number of differing reactions (Dunnett, 2008 in Dunnett and Hitchmough (eds.)).

The second theory is based upon the assumption that at greater species diversity there is a greater chance of present species replacing species that may have been negatively affected by environmental change and variation. The replacement of the weaker species allows for the continuing function of the entire diverse plant community (Dunnett, 2008 in Dunnett and Hitchmough (eds.)).

### ***Aesthetic and Visual Pleasure***

Diverse plant communities are composed of a rich assemblage of textures, forms, colors and a greater chance at any one time of individual species being at the peak of their beauty (see Figure 2.3). Rachel Kaplan and Stephen Kaplan, in *The Experience of Landscape* (1989), also stated that diversity and richness were a component of Complexity, which is one of the four factors they describe as common in an attractive natural landscape, see Ch.2, page 33 of this text, for a full description of Complexity (Kaplan and Kaplan 1989, 53-54). The creation of visually and ecologically rich vegetation may be accomplished only through the understanding of the

value of biodiversity in vegetation composition and the mechanisms that maintain it (Dunnnett, 2008 in Dunnnett and Hitchmough (eds.)).

**Figure 2.3 Mixture of Textures and Colors in a Naturalistic Landscape** (photo taken by author)



### *Maximizing Display Length*

Plant communities with extensive species diversity have a greater length of aesthetic display due to larger amounts of different patterns of growth and flowering schedules. An example of this is groundcover in a deciduous forest in early spring that exploits the available light at ground level before the overstory leaves cast shade in later spring (Dunnnett, 2008 in Dunnnett and Hitchmough (eds.)).

### *Patterns*

Plants in their natural environment are distributed in patterns, which can be used as a template for designing diverse plant communities. The distribution of species may respond to changes in environmental factors such as soil moisture, concentration of particular nutrients, pH, plant growth forms, and the interactions with neighboring species. Locating plants according to the natural patterns results in a naturalistic appearance in the short-term. The long-term persistence of the natural patterns are dependent on the understanding of what causes the patterns and using management regimes to help maintain those patterns (Dunnnett, 2008 in Dunnnett and Hitchmough (eds.)).

### ***Invasiveness in Terms of Biodiversity***

Invasiveness is not a factor of the region a plant comes from, but is a factor of the possession of certain biological traits, such as high seed production, effective seed dispersal, capacity for vegetative spread and low palatability to herbivores. Invasive natives and invasive non-natives both exist, 'invasive' does not describe only non-natives. Competition aids in keeping the diverse number of invasive and unwanted species in check and allows the plant communities to remain diverse (Dunnett and Hitchmough, 2008).

### ***Competition***

The successful combination of diverse plant species is one of the main functions of planting design where aesthetic and functional considerations dominate. In traditional landscape design, competition is not nurtured as part of the design process. The biological questions that pertain to how plants interact with each other and their surrounding environment as a community does not receive consideration. Traditional landscape design does not consider competition because the environment is modified through soil importation, fertilization, irrigation, pruning or other maintenance regimes to the needs of the plants. In naturalistic landscape design, the plants change and develop in response to the environment.

In naturalistic landscape design, aesthetic and functional considerations are equally important as ecological compatibility and long-term dynamics. Arranging specific plants in their final desired positions and making sure that they remain in that location is not the major function in naturalistic landscape design as in traditional landscape design. Instead, naturalistic landscape design focuses on starting and managing the plant community's natural cycle of growth, death and change (Dunnett 2008, 99-100 Dunnett and Hitchmough (eds.)).

### ***Plant Placement***

Planting design should be a compromise between what is artistically and creatively desirable and what is scientifically possible. According to Darrel Morrison, James Hitchmough, Noel Kingsbury, Gustaaf van der Hoven and others, there are multiple approaches to the use of ecologically-informed vegetation and plant communities that can be taken when designing naturalistic landscapes. Darrel Morrison breaks down the approaches into three broad categories that include substitution, diversification of ground layer plantings, and stylization/abstraction of native plant communities. James Hitchmough describes factors used to design naturalistic

landscapes, but did not break them down into named approaches. Noel Kingsbury focuses on the solution for people's need for order, meaning and beauty in the landscapes they use. Along the same lines as Noel Kingsbury, Joan Nassauer, in her article "Messy Ecosystems, Orderly Frames", states that in order for a space to be preferred, naturalistic landscapes "require designing orderly frames for messy ecosystems" (Nassauer, 1995). Gustaaf van der Hoven described the steps to be taken in the design of naturalistic landscapes in the mid-west (Dunnett and Hitchmough (eds.), 2008; van der Hoven, 1977).

Darrel Morrison's three approaches explain the different processes of designing naturalistic landscapes in civic spaces. The approaches cover the gamut from solely replacing non-native plants with those that are native, and using only the fact that they are a native species as a selection criteria, to an approach that focuses mainly on the aesthetic characteristics of plants as the selection criteria. Morrison's approaches include substitution, which is the most like habitat restoration, diversification of ground layer plantings, and stylization/abstraction of native plant communities, which is the approach that focuses mainly on aesthetics (Morrison, 2008 in Dunnett and Hitchmough (eds.)).

### ***Substitution***

Substitution implies a more traditional approach to plant placement, but instead of selecting individual plant species solely based on size, form, color and texture, one selects from a native community of plants. The native community has to be appropriate for the geographic area and has to meet the established aesthetic and functional criteria (Morrison, 2008 in Dunnett and Hitchmough (eds.)).

### ***Diversification of Ground Layer Plantings***

The diversification approach departs from the single-species groundcover approach of traditional landscape design. A diverse mixture of species is planted that possess characteristics that match the soil, light, and moisture availability in the area of the design. Mixed plantings reduces the likelihood that climate extremes, diseases, and insects will kill all plants in the design. A greater potential for aesthetic richness is provided when a wider range of textures, colors, and flowering times are used in the same plant community (Morrison, 2008 in Dunnett and Hitchmough (eds.)).

In naturalistic landscapes of the Midwest and the native prairies after which they are modeled, grasses are important members of the community due to both functional and aesthetic factors. Grasses have a deep network of roots and persistent leaves that aid in the reduction of both wind and water erosion. Rainwater is intercepted by the leaves and moved down along the plant and taken into the ground where the deep root system aids in the infiltration through the soil into the groundwater. Aesthetically, grasses provide a linear filter of the broad-leafed and showy forbs, or wild flowers, among which they are planted. The foliage remains standing throughout the winter and provides vertical structure and added color in the form of copper, tan, and gold. Grasses compose approximately 80% of the species composition in native prairies and naturalistic landscapes that mimic those prairies. The remaining 20% is comprised of a variety of forbs and broad-leaf wildflowers appropriate for the environmental characteristics (see Figure 2.4). The variety of forbs found in native prairies can include black-eyed susan, asters, liatris, false indigo, bundle flower, echinacea, goldenrod, and many others (Morrison, 2008 in Dunnett and Hitchmough (eds.)).

**Figure 2.4 Tall Grass Prairie** (photo taken by author)



### ***Stylization/abstraction of Native Plant Communities***

The naturalistic landscapes in urban areas are typically abstractions of native plant communities and are based on their botanical and aesthetic composition. The naturalistic landscapes are typically simpler in species composition and smaller in area than the native plant

communities. The most important species from the native community, both ecologically and aesthetically, are included along with the distribution patterns that express and heighten the unique character of the native community (Morrison, 2008 in Dunnett and Hitchmough (eds.)).

Through the use of stylization/abstraction there is a potential of featuring multiple plant community types on one site that would not have occurred naturally on the site prior to the design of the naturalistic landscape. Plant communities usually found in periodically or permanently wet areas (see Figure 2.5 for an example of a plant community within an infiltration zone) can be found within the same naturalistic landscape as dry site communities due to the inclusion of stormwater collection areas that act as infiltration zones (Morrison, 2008 in Dunnett and Hitchmough (eds.)).

**Figure 2.5 Plant Community used as an Infiltration Zone** (photo taken by author)



The abstraction of a native plant community in a designed naturalistic landscape includes stylization with the idea that more legibility is provided in the distribution of plants than usually occur within the native plant community. A higher concentration of plants species can also be included in the design of a naturalistic landscape to increase legibility of form and to heighten aesthetic satisfaction (Morrison, 2008 in Dunnett and Hitchmough (eds.)).

According to Hitchmough (2008), in his essay, “Naturalistic herbaceous vegetation for urban landscapes,” in *The Dynamic Landscape*, naturalistic landscapes visually represent something of a paradigm shift from what is known. There is no clear directional grain or apparent order. The individual plants are neither distinct nor cherished and do not create a focal

point. These factors create a landscape that is aesthetically very different for the public and landscape professionals and make it hard for them to embrace and understand, which may be due to the differences in how they see and understand a space. Experts see the space for what it is trying to accomplish, as in creating a naturalistic landscape that mimics the natural landscapes and creates a more sustainable space. The general public typically sees a space for its aesthetic value alone, which explains that they would only see a large area of tall grass and forbs that have no clear pattern or design (Hitchmough, 2008 in Dunnett and Hitchmough (eds.)).

Individual plant species are usually not planted in clearly defined groups, and where they are aggregated, 'outliners,' or individual plants not in the aggregation, of the same species may occur elsewhere in the planting. Aggregations of individual species can be largest and most prevalent with clone-forming forbs, such as Aster and Black-eyed Susan, or grasses, such as Indian Grass and Big Blue Stem, in moist fertile soils where they spread and can eliminate their neighbors (Hitchmough, 2008 in Dunnett and Hitchmough (eds.)).

A rhythmic pattern can occur on less fertile and drier sites as the species repeated across the community, and was most easily observed when the plant species was in flower. Patterns and spatial arrangement allow for a larger number of species located within the same site. The larger number of species facilitates a longer display season that has dramatic changes of character and minimizes negative visual effects. The visual decline of early maturing species and the end of flowering is masked by the growth of adjacent species that have a later climax of visual display (Hitchmough, 2008 in Dunnett and Hitchmough (eds.)).

The continual climax of different species and the subsequent hiding of species on the decline allows the vegetation to read as a continuous sheet, from which different species flower as the sheet becomes taller, but without obvious directional flow (see Figure 2.6). Gaps in vegetation do not have to be managed due to the fact that three to four neighbors of differing species will typically surround each plant. If one plant fails, the neighbors expand to fill in the vacated space. The loss of one species is an opportunity for another species whether it is desirable or non-desirable. The original plant selection is important due to the fact that the selection is what develops the long-term plant community (Hitchmough, 2008 in Dunnett and Hitchmough (eds.)).

**Figure 2.6 Naturalistic Landscape Illustrating a Continuous Sheet of Mainly Grasses** (photo taken by author)



Vegetation selection does not have a standard version, and has to change with the locations and condition of the site. Each individual species, rather than the community, has to fit into the site conditions. Some species in a stereotype plant community will adequately fit while others will not, and will die out and disappear. The key factors that influence environmental fit are site productivity in relation to the potential growth of individual species, the climate, soil moisture, density of herbivores, and the management regime. In the urban context, after environmental fit, color was found to be an extremely important factor for plant selection. When color is added to the scene, the negative effect of height is cancelled out to create a space that is more to scale with people using the space. He also explained that maximizing the color and flowering impact of naturalistic landscape plantings is an important means of maintaining public support (Hitchmough, 2008 in Dunnett and Hitchmough (eds.)).

In urban locations where exotic species are popular and grown in gardens and public landscapes, and the context is more eclectic, the choice of vegetation is a function of free choice and is shaped by the aspiration of the local public and the designers (Hitchmough, 2008 in Dunnett and Hitchmough (eds.)).

In the Midwest, the design of naturalistic landscapes mimics native prairies that once covered the area. Native prairie is composed of native vegetation that has developed within the past 10,000 years. Native Americans played a key role in its evolution through the burning of woodlands and savannah. Woodlands are areas where the most common plant species are canopy

trees with smaller amounts of understory plants. Savannahs are spaces similar to the prairie landscape but with shorter plants species and a sparser vegetation coverage. The combination of human influence and the grazing of wild ungulates, for example bison, created and maintains the native tall grass prairie. Without regular burning or grazing, the prairie can become invaded by scrub trees, weedy forbs and grasses, and then slowly decline (Hitchmough, 2008 in Dunnett and Hitchmough (eds.)).

Naturalistic vegetation is less intensive to maintain, but is not maintenance free. Whether native or non-native, the vegetation relies on informed maintenance for the success of desirable vegetation. If the maintenance regime is not informed, the plant communities can transform into less desirable plant communities (Hitchmough, 2008 in Dunnett and Hitchmough (eds.)).

Tall grass prairies are rich in perennial forbs and dominated by warm season grasses, which grow during the summer months and are fully dormant during the winter. Forbs in the prairies are primarily species that grow vigorously at lower temperatures during early spring and early fall. Differing growth habits allow for a time in spring where the grasses provide low competition, which allows the forbs to move in and become established. Most forb species bloom from early summer to the first frost, which in combination with the late developing warm season grasses, means that the prairie is most colorful in summer and autumn. Prairie grasses remain structurally intact and attractive until the first frost of autumn. After the first frost, the foliage of many species turns yellow, orange, or red and can continue to provide aesthetic pleasure (Hitchmough, 2008 in Dunnett and Hitchmough (eds.)).

The characteristics and design approaches of naturalistic landscapes can only be successful if the general public, who uses the space, can appreciate it. Success is accomplished when the majority of users prefer the designed space and it is maintained and allowed to function as it was designed. Unsuccessful spaces are unused by the public, allowed to fall into disrepair and are later redesigned. Kingsbury (2008) focused on the general public and applies his design approaches in a way that takes people's needs into consideration. He explained that the solution involves stylizing the naturalistic landscape plantings in ways that create meaningful and visually pleasing elements within the landscape. The selection of plant communities focuses not just on what functionally fits into the space, but on what is visually appealing to the public. He also explains that the environment can be slightly altered so that visually appealing plants can be included and prosper. The overall plant communities can be used as large-scale sculptural

material by altering the species mix, which creates a more visually appealing plant mix (Kingsbury, 2008 in Dunnett and Hitchmough (eds.)).

Along with the ideas of Noel Kingsbury (2008), Joan Nassauer (1995) explains that landscape ecology, or naturalistic landscapes, is a design problem that not only deals with ecosystem relationships and artistic problems, in terms of expressing ecological function, but with addressing peoples' cultural expectations (Nassauer, 1995). She states that naturalistic landscape design requires placing orderly frames around messy, naturalistic landscapes. This is due to the fact that people may have a concern for improving the environment through the use of naturalistic landscapes, but not at the expense of the appearance of the landscape. Nassauer (1995), determined that the perception of natural environments, vegetation and water is dependent on cultural interpretation. An example is the cues into human care that landscapes provide, such as mowing, flowering plants and trees, wildlife feeders and houses and bold patterns to name a few. The most important cues for this study are mowing and flowering plants and trees (Nassauer, 1995).

In terms of mowing, it does not mean that a large open expanse of mowed turf is needed to express care. Instead a simple mowed path, or buffer, along circulation paths is all that is needed to express a sense of care and maintenance. The other cue important to this study is the use of flowering plants and trees. Nassauer (1995) states that is naturalistic landscapes contain a high proportion of plants with large, bright flowers, at least in the first few seasons, people are more likely to find them attractive (Nassauer, 1995).

Gustaaf van der Hoven described the principles of naturalistic landscape design in his 1977 paper, "Naturalistic Landscaping," published through the Kansas State University Agricultural Experiment Station and Cooperative Extension Service. His principles tend to be subjective and include statements that do not provide exact definition of ideas, which allows for differing interpretation by its readers. Van der Hoven's principles included: (van der Hoven, 1977).

- *Proportion and Scale* – Balance should exist between the dimensions of length, breadth and height. The placement of elements should not be equally spaced on either side of an axis (van der Hoven, 1977).
- *Unity* – The component parts should create a unified whole (van der Hoven, 1977).

- *Elegance of Line and Shape* – Lines and curves should be fluid and uninterrupted and can be used to focus attention and control movement of motion and vision. Curved lines promote slower movement and straight lines promote a faster and more direct movement (van der Hoven, 1977).
- *Contrast and Harmony* – Lines that flow together tend to be very peaceful and calming, where bold contrast of curve and straight line can produce interest. Combining contrasting foliage and color provides interest in the space, while using a combination of blended flower and foliage color creates a harmonious visual. Using both contrast and harmony within a space creates an effective landscape with both interest and calm (van der Hoven, 1977).
- *Emphasis* – The eye can be directed to a primary point or whole area through the use of emphasis. Secondary points of interest could be created through the use of elements that have less contrast with the overall site than the primary point of emphasis (van der Hoven, 1977).
- *Variety* – A very critical element in naturalistic landscape design is variety. Too much variety can create a chaotic space and too little variety can cause the space to be monotonous and boring (van der Hoven, 1977).
- *Repetition* – Provides variety, meaning and expression. Variety is needed in the shape of lines, forms, textures and colors, but too much variety is not advised. Repetition can be achieved through planting in groups and masses (van der Hoven, 1977).
- *Form* –The flattened, windswept and horizontal form of the prairie can be created through the use of natural looking plants that mimic the natural topography. Form is one of the basic principles useful to design. The main forms of vegetation include: columnar, round, vase, weeping, pyramidal, oval and irregular (van der Hoven, 1977).
- *Texture* – A plant's coarseness or fineness is defined through the appearance of its foliage and the mass effect of the plant when viewed from a distance (see Figure 2.7). Just like variety, too much uniformity in texture can result in monotony and too little uniformity can result in chaos (van der Hoven, 1977).

**Figure 2.7 Mixture of Coarse and finer Textured Plants** (photo taken by author)



- *Color* – Color is a very important factor in the design of naturalistic landscape design. To create a space with a harmonious color scheme, a dominant color can be used throughout the space. The colors of the native prairie are subdued and have little overall change from season to season. To create a space that is harmonious and mimics the colors of a prairie, one can use greens or yellows and golds as the dominant color, see figure 2.8 for an example of a yellow forb (van der Hoven, 1977).

**Figure 2.8 Yellow Forbs** (photo taken by author)



- *Time* – Most art is composed in the realm of three dimensions, which includes height, width and depth. Landscape design is composed of those three, and the inclusion of a fourth, which is time. Time is more important than the other three because vegetation, or the material used to create landscapes, changes over time. An observer can watch as the vegetation develops and goes through phases. Some vegetative phases include adolescence, maturity, and death (van der Hoven, 1977).

### ***Benefits of Naturalistic Landscapes***

Naturalistic landscapes positively affect a large range of people, organisms, and the environment through economic, environmental, physical, psychological and social factors. Naturalistic landscapes can benefit people both physically and psychologically.

#### ***Economic Factors***

Naturalistic landscapes depart from wholesale reliance on traditional horticulturally-based plantings, which refers to plantings composed primarily of exotic species and cultivars. The move away from horticulturally-based plantings has created a new market for native plants and seeds, which creates jobs and money for the area where the native species are propagated for the sale of seed and started plants (Dunnett and Hitchmough (eds.), 2008).

A great economic advantage of naturalistic landscape design is the potential to implement the designed naturalistic landscape with little site modification. Scientific thinking is used in selecting plants based upon the philosophy of placing plants where they fit functionally within the site. Choosing plants according to their fitness to the site reduces the need for drastic and resource-intensive site manipulation. Plants from habitats that share similar environmental characteristics tend to share common traits, which can be exploited in naturalistic landscape design. The need for less site manipulation reduces installation costs and expedites the installation process, which saves both time and money (Dunnett, 2008 in Dunnett and Hitchmough (eds.)).

Naturalistic landscapes are designed to take advantage of characteristics in native and non-native plants, which create landscapes that minimize costs. Once installed, native plant communities need relatively little maintenance due to their ability to work together as a group to

keep invasive species out, which decreases maintenance costs. Competition for light and water among the dense naturalistic plant species greatly reduces the vigor of many of the previously established weed species. Competition also hinders the invasion of weeds from outside the naturalistic plant community. There is little need for added fertilizers, insecticides, and herbicides in naturalistic landscapes, which decreases costs for products and labor. Maintenance cost is further reduced due to the fact that the focus of naturalistic landscapes is not individual plants, which means less tithivating has to occur and there are less replacement and division costs. Maintenance is typically condensed into critical phases of the lifecycle, usually being spring, and involves nonselective management techniques borrowed from nature conservation, as in burning. Nonselective management is a less time and cost intensive process. The use of burning as a means of management, in combination with a lack of turf, means naturalistic landscapes do not need to be mowed on a regular basis like traditional landscapes. No mowing allows for saving money on the mower, gas, oil, maintenance on the mower, and the labor needed for the mowing process (Dunnett and Hitchmough (eds.), 2008; Hitchmough, 2008 in Dunnett and Hitchmough (eds.); van der Hoven, 1977).

The reduction of costs is not the only proof of value for nearby naturalistic landscapes, it has been proven through studies completed by Rachel and Stephen Kaplan and J. Talbot that people were willing to pay higher rents for residences that overlook natural areas, such as parks and green spaces. Employees with views of naturalistic landscapes reported fewer ailments and headaches and were more satisfied with their jobs. The result was fewer sick days and more profit making possibilities for the employer (Talbot and Kaplan, 1984; Kaplan and Kaplan, 1995).

### ***Environmental Factors***

Environmental change for the good can be created with the installation of naturalistic landscape designs especially in urban locations. The use of native plant communities instead of traditional landscape plant communities decreases the use of fertilizers, insecticides and herbicides. The decreased use of these inorganic elements also allows for a decrease in the amount of pollution added to the environment. Fertilizer runoff into streams and other bodies of water can lead to the death of aquatic organisms. Insecticides not only kill pests, but insects that provide positive benefits to the environment, which decreases insect diversity. Insects fill many roles in the environment, which includes predator, prey, pollinator and others. If insects are

harmed, those roles are left unfulfilled. Herbicide use could lead to the destruction of plant diversity. As described in the biodiversity section, a lack of diversity could have effected the natural environment in negative ways (van der Hoven, 1977).

Along with the decreased use of inorganic materials, the use of fossil fuels also decreases when traditional landscapes are replaced with naturalistic landscapes. Lawn mower usage is greatly reduced, if not eliminated, in naturalistic landscape designs, which leads to a reduction in the consumption of fossil fuels and the release of pollutants (van der Hoven, 1977).

### ***Physical, Psychological and Social Factors***

Rachel Kaplan and J. Talbot (1984) explain that having daily contact with naturalistic landscapes can make people happier and can even be seen as a source of community pride. Naturalistic landscapes provide physical benefits to people and organisms both through the creation of naturalistic landscapes and through contact with them. Anna Jorgensen (2008) explained, in her essay “The social and cultural context of ecological plantings,” in *The Dynamic Landscape*, that there is a large body of evidence stating that contact with nature in various forms has a beneficial physical and social effect on human beings (Talbot and Kaplan, 1984; Jorgensen, 2008 in Dunnett and Hitchmough (eds.)).

A number of Scandinavian studies looked at the developmental benefits to children of growing up in natural environments. C. Bang and others explained that playing in complex natural environments creates a positive impact on children’s social play, concentration and motor ability (Bang et al., 1989; Grahn, 1991). Motor ability was also examined by I. Fjortoft and J. Sageie and seen to increase as the diversity in vegetation and topography of the natural playscape increased (Fjortoft and Sageie, 2000). These studies provided evidence suggesting that natural or semi-natural landscapes in urban settings have positive physical and social benefits to children’s development (Jorgensen, 2008 in Dunnett and Hitchmough (eds.)).

Rachel and Stephen Kaplan, in their decades of research, discovered that as participants gained physical skills relevant to outdoor activities, they had an increase in their self-image when they had an increase in the amount of interaction with both natural and naturalistic environments. Through increasing skills, people felt more self-confident and increased their outlook on life. Kaplan and Kaplan also found that after a short period of acclimatization, the participants experienced self-discovery, wholeness, well-being, renewed energy and a sense of restored

health (Kaplan and Kaplan, 1989; Kaplan and Kaplan, 1995; Jorgensen, 2008 in Dunnett and Hitchmough (eds.)).

In *The Experience of Nature*, Rachel and Stephen Kaplan, describe naturalistic landscapes in an urban setting as ‘nearby nature’ and explain the benefits of such natural areas (Kaplan and Kaplan 1995). Nearby nature can be used not only as a social setting, but a place where tranquility is possible even when a vibrant and lively city is surrounding it. The uses and activities one can perform in a naturalistic landscape, or in the Kaplans’ term ‘nearby nature,’ are not only physical activities like biking, hiking, camping and picnicking. They stated that other benefits of the nearby natural area are more circumstantial and involve observation (R. Kaplan, 1984; Bardwell, 1985; Kaplan and Kaplan, 1995).

Rachel and Stephen Kaplan explain that the results of their various studies provide strong support for the fact that nearby-naturalistic landscapes create both psychological and physical benefits. People feel more satisfied with their homes and with their lives when they have nature in their urban environment. Naturalistic landscapes have the ability to create a setting that can be a source of satisfaction to be in, or to observe. The simple knowledge that a naturalistic landscape is located nearby can be a source of pleasure, which shows that the actual use of a naturalistic landscape is not essential in satisfaction (Kaplan and Kaplan, 1995).

Stresses caused by urbanization and population growth create new pressures for urban dwellers and make some old satisfactions harder to achieve. Peace, quiet, fascination with natural environments, a chance to share with others and to do what one wishes, are all important satisfactions to human beings. Urban areas, which contain naturalistic landscape spaces aid in the creation of the people’s satisfactions. Even the smallest view of natural settings can lead to psychological gains. The benefits to human beings of a view of naturalistic landscapes are much greater than one might realize. The focus of the value of naturalistic views is not just passive enjoyment, but cognitive involvement through the use of the mind. The view of a naturalistic vista helps to provide the big picture and reveal the extent of what is in the naturalistic landscape (Kaplan, Kaplan and Ryan, 1998; Kaplan and Kaplan, 1995).

There is considerable documentation stating that providing a view, especially one including vegetation, has positive implications for the health and wellbeing of the viewer. Studies of prisons (Moore, 1981; West, 1986), hospitals (Ulrich, 1984; Verderber, 1982), apartment residences (R. Kaplan, 1985a), and the workplace (R. Kaplan, 1985b), have been used

to illustrate the importance of the view. In the office setting, those with views of naturalistic landscapes feel less frustrated and more patient, find their job more challenging, express greater enthusiasm for their job, and report higher life satisfaction and overall health. The increase in overall health is due to the restorative benefits provided by the naturalistic landscape (Kaplan, Kaplan and Ryan, 1998).

### ***Naturalistic Landscapes used as Restorative Environments***

Rachel and Stephen Kaplan describe restorative environments in their books *The Experience of Nature* and *With People in Mind* (the second book co-authored with Robert Ryan) as an environment that allows a person to become rejuvenated and able to complete needed tasks. Providing distraction, marking a place as distant, and permitting the mind to wander are factors likely to provide restorative benefits as long as the materials used in the landscape design do not detract from the setting. Restoration can take place at very diverse levels, in vastly different amounts of time, and in and around a diverse range of naturalistic areas. A person does not have to notice the change immediately and the change is more likely to occur when a person feels secure enough to let down their guard and become absorbed in the environment without feeling vulnerable. Restorative environments permit reflection and make it possible to determine what is on a person's mind (Kaplan and Kaplan, 1995; Kaplan, Kaplan, and Ryan, 1998).

Nearby naturalistic environments provide many of the restorative benefits and opportunities of an extended encounter with a natural setting, but less intensely. The benefits and opportunities people experienced were closely related to the aesthetic factors. Aesthetic naturalistic environments provide visual pleasure and satisfaction through experience. Naturalistic environments provide a place where people can move about and explore with comfort and confidence (Kaplan and Kaplan, 1995).

Naturalistic environments are found to support human functioning and provide a context in which people can effectively manage information. People have a love-hate relationship with information. The cost of information is paid for in attention and effort. Some tasks are difficult and require the juggling of many issues, which causes constant attention to be difficult to maintain. Direct attention, or constant attention, can wear down a person and their capacity for it diminishes. The wearing down of a person due to direct attention is referred to as mental fatigue and can cause a variety of negative repercussions above and beyond the failure to perform needed tasks. People that are mentally fatigued have difficulty taking in information, are more

likely to make errors, and are less likely to be happy and helpful to fellow humans (Kaplan, Kaplan and Ryan, 1998).

The list of restorative physical and observational activities that can aid a person mentally fatigued is long and includes activities that are fun, exciting, fascinating and transforming. Tranquil and serene settings are typically found to be compelling and absorbing and can be used either for active involvement or passive involvement with the naturalistic space. Passive involvement in naturalistic settings can involve observing seasonal color change and the antics of organisms, listening to the sounds of wind and water, and smelling the fragrance of flowers. Spending time in, and observing, naturalistic environments fosters people's recovery from mental fatigue by allowing them to regain effective functioning. The properties affecting restoration simultaneously concerns both the physical and the mental world and includes being away, extent, fascination and compatibility (Kaplan, Kaplan and Ryan 1998, 17-18).

### ***Being Away***

Recovering from mental fatigue requires that one be at a location other than the source of the fatigue, such as the office. A physical change in place is typically what people think of, but getting away may also be achieved conceptually. The simple act of looking out a window can transport the mind to a more relaxing location (Kaplan, Kaplan and Ryan, 1998).

### ***Extent***

Extent, or a sense of extension in time and space, is needed to make a setting a different world. There needs to be a sense that there is more beyond what meets the eye, and that a person can go on and on. A setting with extent is a coherent whole with no interruptions or interference from things that do not belong. Limiting the scope and extent of a setting can hinder the space's ability to be a restorative setting, despite the fact that it could be away from the source of the stressor. Restorative settings are described as being a whole different world. An example of a location with great extent is a zoo that is designed as a total-immersion experience. Visitors in settings with great extent feel as though they are in a very different place with its own properties and rules. Even though extent is important, it is seen that extent is not perceived as a singular characteristic, but in combination with the context of other issues (Kaplan, Kaplan and Ryan, 1998; Kaplan and Kaplan, 1995).

### ***Fascination***

Fascination involves attention that does not demand effort and is derived from interesting things and places, and from processes such as thinking, doing and wondering. The processes of figuring things out, predicting and wondering, fascinates people. Fascinating environments attract people, keep them from getting bored, and allow them to function without the use of directed attention. Something that is fascinating is hard to resist noticing, or participating in, and the situation can provide time to recover from mental fatigue, which make it a very important aspect of restorative environments (Kaplan, Kaplan and Ryan, 1998).

### ***Compatibility***

This factor of restoration involves the compatibility between a person's inclinations and environmental circumstances. Circumstances include what the setting requires from an individual and what it offers in terms of information and opportunities. People readily relate to the natural environment when dealing with domestication of the wild and observation. Other activities high in compatibility are closely related to survival, as in fire building, constructing shelter, and locomotion (Kaplan, Kaplan and Ryan, 1998).

The natural environment has a special relationship to each of the four factors important to a restorative experience. That special relationship allows naturalistic landscapes to function as successful restorative environments (Kaplan and Kaplan, 1995).

The immediate outcome of contact with naturalistic landscapes includes enjoyment, relaxation, and the lowering of stress levels. People with access to nearby naturalistic landscapes were healthier than other individuals. Long-term, indirect contact also included increased levels of satisfaction with one's home, one's job, and with their overall life, which is an incredible range of positive impacts for a simple and inexpensive environmental change (Kaplan and Kaplan, 1995).

### ***Disadvantages of Naturalistic Landscapes***

Many of the disadvantages of naturalistic landscapes involve how people react and interact with the aesthetic characteristics of the space. Another disadvantage involves the use of plant species that are labeled 'native' even though they may not be a native of that region due to an increased use of the term 'native' (Kingsbury 2008, 63-64 Dunnett and Hitchmough (eds.)).

In the design of naturalistic landscapes, if the designer focuses on the context when creating a space and ignores people's need for an artistic element, the landscape created can be boring to the average person. Woodward noted, in a study of the relationship between people and the landscape, "many ecological designs have also been critiqued for not accommodating people's need for order, meaning and beauty" (Woodward 1997, 222). Habitat creation, or habitat restoration, is an example of focusing on the context and not focusing on the aesthetic elements. In habitat restoration the landscape is typically being treated as a whole entity that is placed in a space instead of as a composition of aesthetic elements, which can result in a landscape that lacks aesthetic qualities (Kingsbury, 2008 in Dunnett and Hitchmough (eds.)).

The increase in popularity of the use of native plants in the United States means that, in the words of Rick Darke (2008), during an interview with Noel Kingsbury, "a lot of native plants are used way beyond their region...for example *Echinacea purpurea*...a prairie plant...is being sold in Delaware as a native, but Delaware has never had any prairie." Therefore, the unknowing public may see the plant species as being native, but does not know the species is not native to their local region. The use of 'native plants' not actually native to the region creates a space that does not provide a snapshot into the history of the region or local character. Also, the use of 'native plants' that are not of the region do not provide the same environmental benefits such as habitat creation and the ability of the plant community to manage itself through competition (Darke 2001; Kingsbury 2008, 75-76 in Dunnett and Hitchmough (eds.)).

### ***Naturalistic Landscape Design's Increase in Popularity***

Morrison explained that the undercurrent of naturalistic landscape design has been strengthened in response to environmental concerns, such as water shortages and excessive use of chemicals and energy in maintaining mowed and manicured landscapes. Naturalistic landscapes are also reinforced by a desire to depart from predictable, generic landscapes that have destroyed regional uniqueness through aesthetically dull spaces. The uniqueness of a region is a factor Dunnett and Hitchmough (2008) give as a reason for the increase in popularity of naturalistic landscapes (Morrison, 2008 in Dunnett and Hitchmough (eds.)).

Dunnett and Hitchmough (2008) explain, in the introduction of *The Dynamic Landscape*, that the ongoing decline of public landscape maintenance, the realization that funding will never reach the levels of the nineteenth and twentieth centuries and the arrival of new social and

environmental movements, has initiated a search for newer planting styles that will invigorate civic landscapes. The social and environmental movements include sustainability and developing local interest (Dunnett and Hitchmough (eds.) 2008, 1-8).

### ***Sustainability***

According to many local planning departments and the evidence they collected, sustainability, when dealing with plants species, is nearly always a factor of the use of native plant species. The species of plants that are likely to be the most sustainable are those that have the ability to perpetuate themselves through sexual or clonal generations and to undergo evolutionary change (Dunnett and Hitchmough (eds.), 2008).

In terms of maintenance, management will be most sustainable when the plant communities are designed from the beginning to be managed through simple non-selective techniques applied to all plants in the community. Such maintenance techniques, when dealing with prairie type naturalistic landscapes, involve burning and mowing. Mowing uses natural resources and produces pollution, but prairie type landscapes only require yearly cutting, instead of weekly cutting needed by turf landscapes, to maintain an optimum space (Hitchmough, 2008 in Dunnett and Hitchmough (eds.)).

Sustainable plant communities can be successful in biological terms, but may not be successful in terms of social sustainability. Naturalistic landscapes may be more successful in the social context if there is a compromise between what is ecological and what the people are familiar with and what they already value. As an example, certain forms and colors from traditional landscape design can be integrated into naturalistic landscape designs (Dunnett and Hitchmough (eds.), 2008).

### ***Local Character***

The increase in popularity of naturalistic landscape design involves the notion of place and local character and illustrates that local character should, where possible, inform planting design. Naturalistic landscape planting designs focuses on retaining local character and replicating the vegetation and plant communities found in the same region of the site. Non-native vegetation can also be used in the design as long as they look like they belong. By creating a space that looks like the native plant communities found in the same region as the designed landscape, the local character of the region is retained. Retaining the local character aids in

giving people a sense of place, meaning they can better relate to the space and possibly have more attachment to it than they would to a traditionally designed landscape (Dunnett and Hitchmough (eds.), 2008).

## **Aesthetic Preference**

Understanding what aesthetic preference is, how it is developed, the factors that influence it and the many previous studies that focus on preferences for natural, native, ecological and naturalistic landscape types is vital to this study. Determining people's preferences for the two naturalistic landscapes of this study must start with a base of knowledge of aesthetic preferences. The knowledge aids in choosing which questions to include on the survey questionnaires and then comparing the results of the surveys to the results of past studies to determine if patterns exist.

### ***What are Aesthetic Preferences***

The Kaplans (1995, 1998) explained much about aesthetic preferences. They note that in the past, aesthetic preference often had a frivolous connotation. Aesthetic preference suggested the decorative rather than the essential, or the favored as opposed to the necessary. Aesthetic preference was often seen as idiosyncratic, because tastes are known to be different from person to person. It was seen as a luxury that only a few could afford to consider. Today, the view taken on aesthetic preference, by professionals in fields related to the environment and landscape design, is in strong contrast to that past position. Professionals view aesthetic preference as being intimately tied to basic concerns because it is an expression of underlying human needs. Aesthetic preference is regarded as the first response to an environment that develops as people mature. As people mature, so do their perceptions of the environments around them. The information an organism acquires through perception of the environment aids it in survival. A person should not only perceive the information, but prefer it. Preference is an expression of a deep and underlying aspect of human functioning.

People's aesthetic preferences are influenced by factors such as whether they could learn more through an environment, whether they would be able to move around in the environment without fear of misdirection, and the level of knowledge a person has for the space. The main factors that influence people's preferences are basic human needs, effective functioning, and social and cultural characteristics. Preferences in terms of human needs are driven by how well a

person understands provided information and through the ability to explore (Hartig, 1993; S. Kaplan, 1987; Kaplan and Kaplan, 1982; Kaplan and Kaplan, 1995; Han, 2007).

### *Preference and Human Needs*

Providing a person's basic need of understanding their surroundings through supplying needed information and giving them opportunities for exploration goes a long way toward creating spaces that are positively preferred. The two factors of understanding and exploration involve decisions based upon visual information and how easily a person can see and how easily they can hide. Understanding and exploration also involve decisions about locomotion and how easily the person can enter and move around the space and whether or not they would feel safe in the space (Kaplan, Kaplan and Ryan, 1998; Kaplan and Kaplan, 1995).

### *Understanding*

Understanding involves storing, using and evaluating information and is one of the two basic fundamentals behind human functioning. Information about family, making a living, food supply, dangers and opportunities is needed for humans to function, survive and mature. Information is gathered from friends and family, publications, television and other media, formal education and the observation of a person's surroundings. People are very efficient in their ability to extract information from the environment around them. Even a brief glimpse of the passing environment provides the information needed. When the environment being examined is a naturalistic landscape, the information is gathered just as it would be for any other space. The gathered information is used to perceive, or judge, the current situation and future possibilities as to being good, bad, pleasant, or painful. If the gathered information is perceived to be positive, then the person is likely to have a high level of preference, or to find the space aesthetically pleasing. Other people in an environment are also a source of information both through conversation and through the observation of their actions and reactions (Kaplan and Kaplan, 1995; Kaplan, Kaplan and Ryan, 1998).

Information connected to the natural environment or naturalistic landscapes is related to the elements within it, like houses, streets, sidewalks, cars, trees, plant species, and other organisms. Elements are important factors needed to determine the space's purpose, though the space is more than just the combination of its contents. The organization of those elements is also a determinant for information collection and comprehension. In other words, in the natural

environment or naturalistic landscape the combination of elements and the organization of those elements is what determines how people perceive and resultantly prefer the space (Kaplan, Kaplan, and Ryan, 1998).

According to Rachel Kaplan, Stephen Kaplan and Robert Ryan (1998), in *With People in Mind* and Rachel and Stephen Kaplan (1995), in *The Experience of Nature*, information comprehension connected to natural environments and naturalistic landscapes is based upon four informational factors, which include complexity, coherence, legibility, and mystery. Complexity and coherence of a landscape are based on the two-dimensional plane and involve direct perception of the scene's elements in basic terms, such as their number, grouping and placement. In contrast, legibility and mystery deal with the inference of a third dimension and how it would be if the person were in the space. Coherence and legibility provide information that allows the viewer to make sense of the space. Well-organized and distinctive spaces can be easier for the viewer to understand. In contrast, complexity and mystery provide information concerning exploration, due to the variety of elements, or because of cues that can imply that there is more to be seen (Kaplan, Kaplan and Ryan 1998, 13).

- *Complexity* – The intricacy, richness and number of different visual elements in a scene aids in defining complexity. Complexity illustrates what is going on and what there is to look at within a space. Complexity uses visual clues found on the picture plane and not clues that illustrate depth. According to Rachel and Stephen Kaplan and Stephen Ryan in *With People in Mind*, in 1998, the authors did not agree with the popular view of complexity, which stated that too little was boring, but too much was overwhelming. Instead, they believed that it is based on the confusion between coherence and complexity and the fact that it is too easy to sacrifice coherence in a highly complex setting (Kaplan and Kaplan 1995, 53-54; Kaplan, Kaplan and Ryan 1998, 14).
- *Coherence* – A factor that has received little study, Kaplan and Kaplan believe coherence provides a sense of order and aids in directing a viewer's attention to certain aspects of the space. A coherent space is orderly and hangs together, and is enhanced by elements that aid in the organization of the elements into patterns of brightness, size and textures. The patterns then can be used to create a few major units within the space. Rachel and Stephen Kaplan explain that, "the properties of

the major units, such as texture, size and location are assumed to be the province of the location system, an ancient structure that processes visual information with great speed and little need for inference” (S. Kaplan, 1970; Kaplan and Kaplan, 1982). Just as with complexity, coherence involves little inference and relies on the two-dimensional picture plane of a space. A coherent space allows the viewer to make sense of the environment. Orderly environments are easier to process and understand, but cannot be complex enough to cause the viewer to want to explore the space. The trade-off between coherence and complexity needs to be considered. A messy space is usually considered highly complex, but is more likely to be lacking in coherence. A space could be both high in complexity and high in coherence (Kaplan and Kaplan 1995, 54).

- *Legibility* – Rachel and Stephen Kaplan used Kevin Lynch’s (1960) idea from *The Image of the City*, of legibility, which includes what they considered as understanding and referred to a more structural aspect of that understanding. Lynch explained that coherence and structure are needed to develop legible space. A legible space is one that is easy to understand and to remember. The space can also be well structured and contain distinctive and memorable elements that allow for way finding both through and back out of the space. Legibility provides a guarantee, or prediction, of the viewer’s ability to both comprehend and to function effectively (Lynch 1960; Kaplan and Kaplan 1995, 55; Kaplan, Kaplan and Ryan 1998, 15).
- *Mystery* – Elements in the space are intriguing and encourage the viewer to enter into the space. By entering the space, the viewer is provided the opportunity to learn more than what is not immediately apparent from the entrance of the space or the original vantage point. Mystery can be created through the inclusion of elements such as, a bend in the path, a brightly lit area partly obscured by foliage, and landform changes. Mystery plays a strong role in viewer preferences. Hubbard and Kimball, in 1917, asserted that “it is a pleasant challenge to the imagination which sets the observer to trying to determine for himself by closer investigation what is concealed from his first glance, or if this be impossible, to

filling in and completing the unseen landscape according to the play of his own fancy” (Hubbard and Kimball 1917, 82; Kaplan and Kaplan 1995, 55-56).

The four informational factors described here have to do with how viewers receive information from the environment itself, which they use to understand the landscape and begin developing an aesthetic preference. Viewers can also receive information from other sources such as way-finding and educational material provided through signage and other printed medias.

### *Way-finding Material*

Observers and visitors to a site require way-finding material and information to avoid getting lost, to provide guidance to develop an understanding of a setting, to understand the restrictions to the space’s use, and to anticipate any consequences that may occur from using the space (see Figure 2.9). Sharing information provides interesting paradoxes. An example shows that despite the viewer’s desire for information, they frequently ignore the information that is provided. Another paradox explains that people tend to provide information more freely than they want to receive it, therefore provided information should be interesting and relevant to all audiences no matter their level of knowledge (Kaplan, Kaplan and Ryan, 1998).

**Figure 2.9 Way-finding and Informational Signage** (photo taken by author)



### *Familiarity*

The major factor accounting for differences in aesthetic preferences is familiarity of the space and experiences associated with the space. Familiarity is gained through circumstances

such as where a person lives, where a person has lived, where a person has visited and the characteristics of a person's culture, subculture, and family. Ethnic differences are parts of such experiences and so are the sub-cultural patterns of age groups. Even though familiarity is a major indicator in understanding variations in people, it is not a simple predictor of preference (Herzog et al., 2000; Kaplan and Kaplan, 1995).

Familiarity through living in a space is a good indicator of strong feelings for the local space, whether the feelings are positive or negative. Familiarity clearly affects preference, but it is not clear, or predictable, what that effect would be. For familiarity with a local space, does not mean that the space may be seen as less distasteful just because the person is familiar with it. Visitors can rapidly become familiar with a space and can recognize scenes from it. But, a resident's experiences within a space can reflect greater differentiations of landscape features and a more varied appreciation of the characteristics of the space when compared to those of a visitor to the space. Residents are also likely to be attached to the space in different ways than the visitor. Due to the importance of familiarity in conjunction with where a person grew up, lives, or is in contact with, this study uses survey questionnaires to identify where the respondents grew up, where they currently live, and how often they attend naturalistic landscape spaces. Another factor that influences familiarity is what a person has studied in school and in formal classes (Herzog et al. 2000, 342-343; Kaplan and Kaplan 1995, 85-86; Zube, 1984).

A person's educational background, when focused on ecological subjects and landscape design, makes them an expert in the subject of naturalistic landscapes. Several factors are important to consider with respect to the perceptions and preferences of individuals who are experts in professions that are related to the environment. The experience and preferences of experts are the factors that have the greatest impact on the design, planning and management of naturalistic landscapes. Experts are usually expected to be more discerning and more differentiated about their preferences since they possess a greater knowledge of the environment. Experts are also expected to appreciate and prefer naturalistic environments regardless of content or spatial organization due to the fact that these are the environments they have chosen to devote their professional careers to. The process of training in the respective specialty is closely involved with learning to see the environment in a different way than the person has previously known. Planners, foresters, resource managers and designers, in the studies of Rachel and Stephen Kaplan, were shown to possess judgments that did not correspond to the judgments of the

general public. Buhyoff, Wellman, Harvey and Fraser, in 1978, found that experts and the general public had no correlation in regards to their preference ratings. Experts did not necessarily recognize changes in perceptions between themselves and the general public, because all people assume that they see the environment in a similar way as other people. Due to the importance of educational backgrounds and expertise and how they influence aesthetic preference, the educational backgrounds and knowledge levels of the respondents were investigated using this study's survey questionnaires (Buhyoff et al., 1978; Kaplan and Kaplan, 1995; Kaplan, Kaplan and Ryan, 1998; Herzog et al., 2000).

The knowledge that these differences occur help to make the aesthetic preference differences seem less idiosyncratic, or based on people's tastes, and can make it easier to reach a common understanding when experts and the general public struggle to reach a solution. Again, to further understand the respondents associated with this study, the differences of the respondents were investigated using the survey questionnaires. Receiving and processing information is not the only factor people need a naturalistic landscape to provide, people also have a desire to explore and find out more (Kaplan, Kaplan and Ryan, 1998).

### ***Exploration***

The second category of human needs is the need to explore and to determine more about the happenings in a person's surroundings while feeling safe. Exploration is an important element in developing experiences. It helps people expand their knowledge, determine what lies ahead and increases their ability to understand previously unknown and confusing situations (Kaplan and Kaplan, 1995).

A way to entice exploration is to provide short interpretive trails into the unfamiliar space. Placing the trails within easy reach of parking and providing maps of the trails also help to create a scene that aids in enticing people to explore. By providing the trails close to parking also provides a way for them to explore on their own terms and allows them to explore while feeling safe through providing a quick way out of the space (Kaplan, Kaplan and Ryan, 1998).

Exploration, just as understanding, is greatly affected by previous experiences. Those experiences help the person to very quickly discern how much they would prefer a space. Without realizing it, people imagine themselves in the space and can rapidly assess how well they could function if they were there. For instance, if a person has been in a similar space and had difficulties functioning, they can easily infer that this space will prove to be the same.

Overall, people are seekers and prefer spaces that provided opportunities for them to venture out and explore. Exploration is enhanced by hints in the environment that offer possibilities for discovery and adventure. Therefore, because the need to explore is a human need, it is reasonable to determine that preferences will be greater where safe exploration is facilitated, like in natural and naturalistic environments (Kaplan, Kaplan and Ryan, 1998).

### ***Preference and Effective Functioning***

People differ from each other and see the world, conceptually, through different eyes and bring diverse backgrounds to new experiences and have differing preferences for those experiences and the spaces they occur in. As explained earlier, aesthetic reactions reflect neither a casual nor a trivial aspect of the human makeup. They instead, “constitute a guide to human behavior that is both ancient and far-reaching. Underlying such reactions is an assessment of the environment in terms of its compatibility with human functioning. Thus, aesthetic reactions are an indication of an environment where effective human functioning is more likely to occur” (Kaplan and Kaplan 1995, 10). Effective functioning is the ability to effectively complete needed activities within a space (Kaplan and Kaplan, 1995).

In an environment that fosters effective functioning, the individual experience provides a sense of safety and competence. A feeling of comfort regarding the situation should also be expected. These three feelings do not necessarily happen individually, but overlap and occur simultaneously.

### ***Preference and Safety***

In the study “Woodland spaces and edges: their impact on perception of safety and preference”, by A. Jorgensen, J. Hitchmough, and T. Calvert (2002) safety was found to be a significant influence on preference in civic spaces. Their study determined that respondents prefer dense and unsafe plantings as long as they can see areas of sparser plantings that can be used as a path of escape. Parsons (1995) also determined that naturalistic shrubby plantings are considered less safe than their sparse counterparts. According to both references, if an area of less dense vegetation is not present, the dense naturalistic landscape should be designed with areas of clear lines of sight in order for the respondent to feel safe and have a high preference for the naturalistic landscape. The organization of plantings within a naturalistic landscape is not the only factor influencing perceived safety (Parsons, 1995; Jorgensen, A. et al., 2002).

Gender, in conjunction with perceived safety, was found to be a significant indicator of aesthetic preferences. It was found that women tended to have a lower level of perceived safety than men, causing women to have a more negative preference for both urban and naturalistic landscape spaces (Valentine, 1989; Madge, 1997; Jorgensen et al., 2002; Dunnett and Hitchmough (eds.), 2008).

### ***Preference and the Social and Cultural Context***

Anna Jorgensen (2008), in her essay “The social and cultural context of ecological plantings,” in *The Dynamic Landscape*, identifies two explanations behind people’s reaction to landscapes. She explains that people have an innate, or biological, response to landscapes and that the other response to landscapes is driven by a person’s cultural background and personal development, to a greater or lesser degree (Dunnett and Hitchmough (eds.), 2008).

Historically, the people who supported the explanation that people’s preferences were driven by innate responses, concentrated on landscape preference research to attempt to discover the types of landscapes humans preferred. The nature of this research could, at times, obscure the complexity of people’s attitudes, which was relevant to the responses of ecological plantings because such plantings had the ability to arouse strong and conflicting responses (Dunnett and Hitchmough (eds.), 2008).

Supporters of the explanation that responses to the landscape were acquired, and not innate, believed that human aesthetic preference was not an abstract or static concept. Instead, it was a process deeply embedded in changing cultural values and individual experiences. E. Lyons, in 1983, determined that age, gender, place of residence and familiarity aided in the determination of landscape preferences. She also concluded that if variables such as age, place of residence and familiarity influenced landscape, then preferences were dynamic and changed over time. S. Bourassa, in 1991, supported Jorgensen’s idea of two explanations driving preference. He stated there was a biological component in conjunction with cultural and personal components that drove preferences. He described the personal component as a combination of the individual’s personal interpretation of the biological, or innate response, and the cultural rules set out by the group. He believed the cultural rules were derived from the process by which different groups in a society assign symbolic meanings to landscape, which also aided in reinforcing group identity. The combination of both the personal and cultural characteristics helped determine the reaction and resulting preference. Given that personal and cultural factors

played a role in preference, a deeper investigation into their impact on people and their resulting preferences would be explained (Bourassa, 1991; Dunnett and Hitchmough (eds.), 2008).

The impact of personal factors on preference was examined for many factors including education, occupation, income, age, familiarity and gender. As Bourassa noted, these factors were constantly changing, which implied that preferences were not static and developed as people develop. The two main factors that influenced perception and the resulting preference were expertise and occupation, as seen in the earlier section that focuses on information and how expertise influenced understanding. Buttel and Flinn, in 1978 stated that age and place of residence were good predictors of support for environmental programs and awareness of the environmental problems (Buttel and Flinn, 1978; Dunnett and Hitchmough (eds.), 2008).

E. Lyons completed a study in 1983, which confirmed that age was an important factor in landscape preference. The study discovered that young children expressed the highest preference ratings for natural landscapes. Also according to Lyons' study, elderly people expressed the lowest preference ratings for natural landscapes. There was also a significant dip in preference levels for the teenage years. Herzog et al., in 2000, reported similar findings. The studies also found that adults had lower preference ratings than young children and higher levels than teenagers. The adult scores were more variable than the children and teens, which suggested that by the time people reached adulthood, other factors besides age came into play (Herzog et al., 2000; Dunnett and Hitchmough (eds.), 2008).

Familiarity, as described under the section on Preference and Human Needs and Understanding, had the ability to influence people's information retention, understanding, and resulting preferences. Research into familiarity suggested that it could influence the perception of different types of vegetation, and therefore the negative or positive preference for those vegetation types. E. Lyon's study, in 1983, showed that respondents had higher preferences for their local biomes, or climatic zones with the local and distinctive vegetation they were used to seeing. Familiarity with natural landscapes was seen to enhance preferences for the landscapes, therefore it was logical to assume that familiarity with natural vegetation would produce an enhanced preference for naturalistic landscapes (Kaplan, 1977; Lyons, 1983; Dunnett and Hitchmough (eds.), 2008).

The factors, found to influence preference in previous studies, also influenced this study through providing aspects of the respondents' that should be included on the survey

questionnaires. The survey questionnaires could then determine if the aspects such as age, education, occupation, and familiarity were an influence on aesthetic preference for this study.

### *Previous Preference Studies*

Previous studies determined people's preferences for naturalistic landscapes and provided information on factors that this study could use to determine what influences aesthetic preference. Many of the previous studies were completed through providing the respondent with pictures of natural spaces. The respondent then rated the space based on their preferences level. Studies completed by Rachel and Stephen Kaplan and Roger Ulrich provided information that illustrates methods and outcomes that are useful in understanding how people may react to naturalistic landscape spaces.

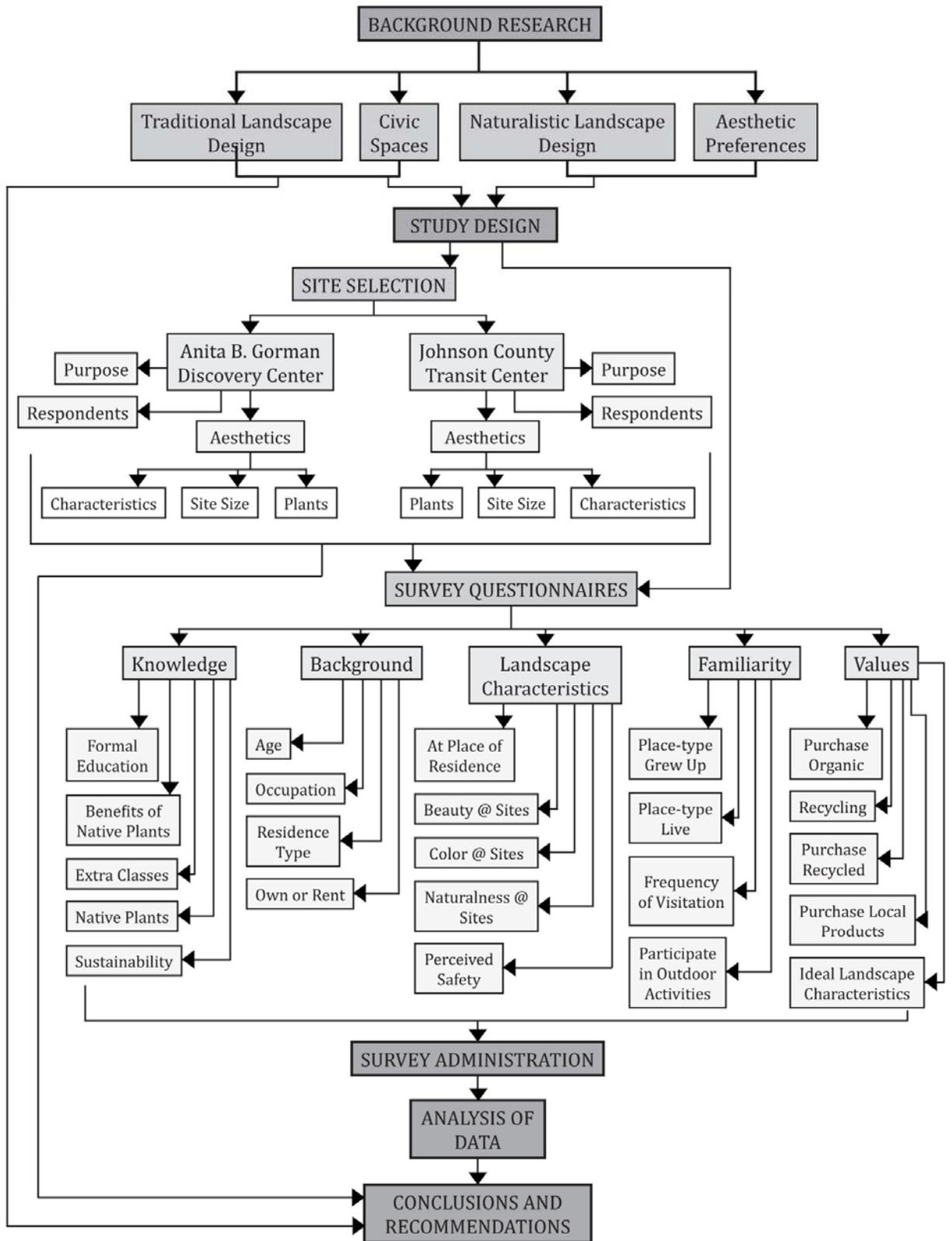
In the 1970s, Rachel and Stephen Kaplan began their research on people's preferences for natural landscape scenes. The research followed previous works in its basic approach. Individuals were asked to look at each stimulus and indicate how much they preferred it. The first studies presented scenes on slides for a fixed time and the later studies, which used printed photographs, allowed the individual to pace themselves. As with previous studies focused on psychological preferences, the scenes were rated in terms of other qualities, which could then be related to the preference levels to further understand those preferences. Responses to printed two-dimensional representations were surprisingly similar to what they were in the setting itself (Kaplan and Kaplan, 1995).

Methods used in previous studies were an influence in the physical design of this study. Due to the fact that previous studies that used pictures of spaces as the subjects of the study and studies that used physical spaces as subjects had similar results, the type of subject used in this study was not limited. For ease of administration and respondent selection, physical naturalistic landscape spaces were used as the subjects for this study.

## **CHAPTER 3 - Methodology**

This study has two purposes. The first purpose is to evaluate people's preference levels for naturalistic landscapes in civic spaces so as to better understand what influences those preferences. The second is to use that knowledge to make decisions regarding future design of naturalistic landscapes and educational aspects of naturalistic landscapes. Background research was used to gather applicable information, to develop this study's overall design (see Figure 3.1). The study design involves choosing two physical sites and creating survey questionnaires. The survey questionnaires were developed using information from the background research and from the characteristics of the two selected study sites, which were the locations for the administration of the questionnaires. Statistical data gathered from the survey questionnaires was coded and analyzed statistically (see Figure 3.1). Qualitative data gathered from the survey questionnaires was grouped into logical content clusters. After analysis was complete, the results of the two sites were compared to each other and to the results from previously completed preference studies. Conclusions were drawn to identify overall patterns and areas where the study could be further developed. Recommendations were given to provide suggestions for creating naturalistic spaces that positively affects respondents' preference levels (see Figure 3.1).

Figure 3.1 Study Diagram 2 – Illustration of the Methodology



## **Background Research - Literature**

Existing writings were used to develop an understanding of civic spaces, traditional landscape design and naturalistic landscape design. Existing writings, in conjunction with previously conducted studies, were used to create an understanding of aesthetic preferences.

### ***Civic Spaces***

Clark and Stankey (1979) and Rachel and Stephen Kaplan's (1995) research in conjunction with the author's ideas was used to describe what characterizes a civic open space. Characteristics of civic open spaces includes the scale, program, and content of the space, which is used to inform the reader on what a civic space is and to locate a physical site for the administration of the survey questionnaires. Another aspect used to identify sites for administration was information on traditional landscape design.

### ***Traditional Landscape Design***

The characteristics of traditional landscape design were illustrated using existing writings in a book edited by Dunnett and Hitchmough (2008). Knowledge of traditional landscape design principles provided a base for understanding what is typically the design process used in civic open spaces. Once traditional landscape design principles are understood, the differences between traditional landscape design and naturalistic landscape design could be identified.

### ***Naturalistic Landscape Design***

To develop a more cohesive understanding of naturalistic landscape design, books and papers by Dunnett and Hitchmough (2008), van der Hoven (1977), Kingsbury (2008), Thompson (2008), Morrison (2008), and others were used. Research was completed on plant selection, plant placement, maintenance and management. Along with the benefits and disadvantages of naturalistic landscapes and naturalistic landscape design's increase in popularity.

Knowledge gained from researching naturalistic landscape design was used to choose sites used as the subjects of this study. It was also used to develop some of the survey questions meant to judge the level of understanding of the respondent. The subject most used in developing the survey was aesthetic preference.

## *Aesthetic Preferences*

Writings and previous preference studies completed by Rachel Kaplan (1982, 1985, 1995, 1997, 1998), Stephen Kaplan (1982, 1987, 1995, 1998), R.L. Ryan (1998), Anna Jorgensen (2002, 2008), Hitchmough (2008), Lyons (1983), Herzog (2000), and many others were used to explain aesthetic preferences and provide information on previous preference studies. The information was used in the development in the design of the study, in terms of choosing to use physical locations for the administration of the survey questionnaire. The information was also used to develop the questions in the survey questionnaires. The results from this study's questionnaires were then referenced back to the results of previous preference studies to identify any similarities or differences. The similarities and differences would then be reported in the conclusions chapter.

## **Site Selection**

The chosen physical locations provide their own groups of respondents through the people that visit the site, which meant that a group of respondents did not have to be gathered. The use of physical locations also cut out the act of collecting and compiling photographs for the respondents to rate. The use of physical locations allowed for studying actual users of the space and not just a random sampling of people. Studying actual users provided an insight into their opinions for a space they interact with.

To provide a more varied respondent group and a more representative sample of people, two physical sites were chosen. Knowledge of the mid-west's native tall-grass prairie and the author's familiarity with the area drove the decision to focus on naturalistic landscapes in the mid-west. For close access to the sites, two sites in the greater Kansas City area were chosen for administering the questionnaires.

The two sites chosen were the Antia B. Gorman Discovery Center in Kansas City, Missouri, and the Johnson County Transit Center in Olathe, Kansas. The two sites have both similarities and differences. The similarities and differences involve the location of the site, purpose of the site, the aesthetic attributes and the people attending the site.

### ***Anita B. Gorman Discovery Center***

The Anita B. Gorman Conservation Discovery Center opened April, 2002, and is located in Kansas City, Missouri. The Discovery Center is a part of the Missouri Department of Conservation and the Missouri Department of Natural Resources.

#### ***Purpose***

The Discovery Center “focuses its educational programs on helping urban children and adults appreciate the bounty and beauty of nature, and learn outdoor skills such as hiking, camping, wildlife viewing and growing native plants” (mdconline Discovery Center). They also provide educational programs that focus on the history of Missouri, such as a program focused on the expedition of Lewis and Clark and the history of the area at that time. The Discovery Center uses its naturalistic demonstration landscapes to “teach urban citizens how valuable and necessary nature is to the city and to the people who live there” (mdconline Discovery Center).

#### ***Aesthetic Attributes***

The Discovery Center is located in an urban location and surrounded by corporate buildings and some residential areas (see Figure 3.2). The Discovery Center sits on ten acres of gardens, wetlands, and walkways. Within the ten acres are a constructed naturalistic native prairie landscape of less than one acre and a constructed naturalistic landscape located within the medians of the parking lot (see Figure 3.2). The native prairie landscape is composed primarily of native grasses with some native forbs. Some of the native grasses planted in the prairie landscape include, Indian grass, big bluestem, switchgrass and many others. Some of the forbs include black-eyed susan, aster, and goldenrod.

**Figure 3.2 Anita B. Gorman Discovery Center Context Map** (Photo from Google Maps, edited by author)



The naturalistic parking lot landscape is composed primarily of native forbs with some native grasses and native trees. Some of the grasses include Indian grass, inland sea oats and switch grass. Some of the forbs include aster, joe-pye weed, tickseed sunflower and goldenrod. Also included are native woody species such as wild grape and sumac. One of the main trees used in the naturalistic parking lot landscape is an oak species.

The survey questionnaire was administered in September when the grasses were green and contained inflorescences, or seed heads. Many of the forbs were at their peak and therefore flowering. The sumac had started to transform into its fall colors, which are orange, red, and yellow (see Figures 3.3 and 3.4).

**Figure 3.3 Bioswale in the Parking Lot of the Discovery Center** (photo taken by author)



**Figure 3.4 Prairie Landscape at the Discovery Center** (photo taken by author)



### ***People Attending the Site***

The people attending the Discovery Center are employees, seminar leaders, activity volunteers and visitors. The mix of people attending the site provided a mix of reasons for being there. Considering that the Discovery Center focuses on education and environmental topics, the employees and seminar leaders probably have an interest in what goes on at the site and what the site offers. Volunteers and visitors attend the site because they have an interest in what they can see, do and learn from the site. People attending the site were seen to be of all ages from babies to the elderly.

## *Johnson County Transit Center*

The Johnson County Transit Center was dedicated in 2001. The Transit Center is located in Olathe, Kansas, and is the operations facility for the county's mass transit system.

### *Purpose*

The purpose of the site is to “study the effects of stormwater runoff” (Johnson County Stormwater Management Program). The large amount of non-permeable surfaces, such as pavement and buildings, at the Transit Center makes it a good location for a stormwater infiltration study. The Transit Center is participating in the Johnson County Stormwater Management Program that began in the 1990s. In the summer of 2005 the infiltration study began at the Transit Center by measuring stormwater runoff from the traditional landscape design. After the initial measures were taken, implementation of a naturalistic native prairie landscape began in Spring 2007 by replacing the turf with native grasses and forbs (Johnson County Stormwater Management Program; theJO).

### *Aesthetic Attributes*

The Johnson County Transit Center is located in a peri-urban location. Other industrial campuses that are composed primarily of non-permeable surfaces surround the Transit Center (see Figure 3.5). The naturalistic landscape is located at the entrance of the building and the parking lot. The landscape also surrounds the side of the building by Highway 56 (see Figure 3.5). The naturalistic landscape is composed of native grasses, native forbs, and native shrubs and native trees. Some of the native grasses include side oats grama, little bluestem, buffalo grass and blue grama. The native forbs include aster, goldenrod, black-eyed susan and butterfly milkweed. Native shrubs include buttonbush and indigo bush amorpha. Native trees include eastern redbud and honeylocust.

**Figure 3.5 Johnson County Transit Center Context Map** (Photo from Google Maps, edited by author)



The landscape contains a buffer, or border area of a few feet, that surrounds the naturalistic landscape. The designed buffer is not being maintained well and currently is overgrown in some areas, see Figure 3.6. The landscape is primarily a large expanse of native prairie with small amounts of color. The survey questionnaire was administered in September when the grasses contained inflorescence and were at their peak of aesthetic interest. Some of the native forbs were flowering and at their peak of aesthetic interest (see Figure 3.7 and 3.8).

**Figure 3.6 Buffer at the Transit Center** (photo taken by author)



**Figure 3.7 Prairie Landscape at the Transit Center** (photo taken by author)



**Figure 3.8 Building Entrance at the Transit Center** (photo taken by author)



### ***People Attending the Site***

People attending the Johnson County Transit Center are typically employees. Considering that the Transit Center does not focus on education and environmental subjects, those that are employed at the Transit Center do not necessarily have a direct interest in environmental issues, what goes on at the site and what the site offers. The age range of people attending the Transit Center would be of employable age.

The characteristics of the site, along with the background research, reported on earlier in Chapter 2, were used to develop survey questionnaires. The questionnaires were used to ask questions of the people attending the two sites.

### **Survey Questionnaire**

Two questionnaires were developed, one for each of the study sites. The questions contained within the two questionnaires are very similar. The only difference is the inclusion of an extra section of questions on the questionnaire administered the Discovery Center. The extra section of questions is included because the Discovery Center has two naturalistic landscape spaces as opposed to one at the Transit Center.

The questionnaires for both sites are described using three parts: part one contains questions pertaining to the sites' naturalistic landscapes, part two contains questions pertaining to

native landscapes and their benefits, and part three contains questions pertaining to the respondents' backgrounds, knowledge levels, and values.

Part One contained questions used to determine the preference for the overall naturalistic landscape and for the individual characteristics the landscape is comprised of. By determining the overall preference and the preferences of the characteristics, a better illustration of what is liked and what is not liked could be drawn. The questions in Part One were a combination of close-ended (the answer is provided and the respondent has to choose the best answer) and open-ended (the respondent can write in any answer they choose). The close-ended questions were used to rate a category, with one being a low/weak feeling for the category, three being a neutral feeling for the category, and 5 being a strong feeling for the category. The open-ended questions were used to ask for a respondent's reasoning or for comments. The questions contained in Part One and the purpose behind the questions, are as follows:

1. Rate your level of preference for the naturalistic landscape – The question was addressed to determine the respondent's overall level of preference for the space.
2. Rate each category: Beauty, Naturalness, Order and Color – Determining the level of each category helped to determine more about why the respondent had their certain level of preference. The factors were chosen using information gathered during the research process on naturalistic landscape design in Chapter Two.
3. Rate the level of perceived safety for the space – Perceived safety was chosen as a question because safety was seen to be an indicator of preference levels in previous studies, which was reported in Chapter Two under Aesthetic Preference.
4. How often do you visit the site? – Asking the frequency of visitation aided in determining if the respondent was an employee or a visitor, especially at the Discovery Center where not all respondents were employees.
5. What is your favorite time of year to visit the site? – The question was meant to aid in understanding what the respondents liked and did not like.
6. If this is the first time visiting the site, would you return? – Determining if the respondent would return was another way of finding out if they liked the space.

Part Two contained questions focused on native landscapes and asked questions regarding the respondent's amount of knowledge on native plants and their possible benefits. The questions were open-ended, so the respondent wrote one word to a few sentences to answer the question. The questions in Part Two and the purpose behind them are as follows:

1. What are Native Plants? – The question was used to determine the respondent's level of knowledge for native plants. In previous preference studies, knowledge was seen to effect preference levels, so the question was included in the questionnaire. Knowledge gained from the background research on Naturalistic Landscape Design, reported in Chapter Two under Naturalistic Landscape Design, was used to judge the respondents' answers to this question.
2. What are the benefits of native landscapes? – This question was used in the same way as the previous question, to determine the respondent's level of knowledge. The cause for developing the question and the way of judging it was also the same as the previous question.

Part Three's questions pertained to the respondents' backgrounds and values. The questions are both close-ended and open-ended. The open-ended questions were used to clarify answers and to determine the level of understanding. The questions in Part Three and the purpose behind them are as follows:

1. In which age range do you fit? – Age was determined because it was found to be an indicator of preference in previous studies, reported in Chapter Two under Aesthetic Preference.
2. Enter your grade level or the highest degree you have achieved. If higher than high school, please include your area(s) of focus – The level of education and focus was asked to determine the amount of familiarity, as in formal education and expertise, the respondent possesses for naturalistic landscapes and topics relevant to those spaces. Previous preference studies, reported on in Chapter Two under Aesthetic Preference, found that familiarity, when associated with formal knowledge and expertise could be an indicator of preference, which was another reason for determining the level of formal education.
3. Have you been involved in any classes, seminars, conferences, etc. that focus on ecology, sustainability, or environmental sensitivity. If yes, briefly explain the

content – This question was used to further identify the level of formal knowledge and familiarity the respondent possesses for naturalistic landscapes and topics relevant to those landscapes. The question was chosen due to the findings of previous preference studies and reported in Chapter Two under Aesthetic Preference, just as the previous question.

4. What is your Occupation? – The occupation of the respondent was determined to judge their level of familiarity for naturalistic landscapes and topics relevant to those landscapes. The question was also used to identify those respondents that work at the site.
5. In what place-type do you currently live? – Determining the place-type in which the respondent lives helps to identify the respondent's level of familiarity for naturalistic landscapes. The type of familiarity addressed in this question involves the familiarity that is gained with continual contact with the natural landscapes that are the model for naturalistic landscapes. Unlike the previous questions, it does not involve familiarity gained through formal education. This type of familiarity was found in previous preference studies, reported in Chapter Two under Aesthetic Preference, to not be a significant indicator of preferences, but the level of familiarity is still important to determine.
6. In what city/town do you currently reside and what is the approximate population? – Determining the actual city or town and its population, was used to understand more about where the respondent lives.
7. In what place-type did you grow up, if different from your current place-type? – This question was used just as question five was used.
8. In what city/town did you grow up and what is the approximate population? – This question was used just as question six was used.
9. What residence type do you live in? – The question was used to determine the type of home the respondent lives in, as in single family, multi family and apartment, and to learn more about the respondents.
10. Do you own your place of residence? – This question was developed for the same reasons as the previous question.

11. What landscape characteristics best identify the landscape at your place of residence? – The question was used to determine the types of elements in the respondent’s home landscape. Understanding the types of elements the respondent possesses aids in determining what the respondent likes and finds important. The elements were chosen based on the information reported in Chapter Two on traditional landscape design and naturalistic landscape design.
12. What do you find to be their most important aspect of the landscape/garden at your place of residence? – This question addresses the values of the respondent by determining what aspect of landscapes they find important. The aspects were chosen based on information reported in Chapter Two on traditional landscape design and naturalistic landscape design.
13. What comes to mind when you hear the phrase “sustainability”? – Sustainability is a major benefit of naturalistic landscape design, reported on in Chapter Two under Naturalistic Landscape Design. By determining the respondent’s level of knowledge of and familiarity with sustainability is important due to the fact that knowledge was seen to influence preference, reported on in Chapter Two Under Aesthetic Preference.
14. Do you recycle on a regular basis? – Determining if the respondent recycles was used to judge their values.
15. Do you buy recycled products? – Determining if the respondent buys recycled products was used in the same way as the previous question.
16. Do you purchase locally grown products? – This question was also used in the same way as question 14.
17. Do you purchase organic products? – This question was again, used in the same way as question 14.
18. Do you participate in outdoor activities? – This question was included because the participation in outdoor activities was found to be an influence of preference according to previous preference studies. The previous preference studies are reported in Chapter Two under Aesthetic Preference.

After the questions were chosen and the survey questionnaires were developed they were sent to the IRB Board for review of ethics. When the questionnaires passed the IRB review, they

were returned to the author. The accepted questionnaires could then be administered at the Anita B. Gorman Discovery Center and the Johnson County Transit Center.

### **Survey Administration**

Administration of the survey questionnaires was undertaken differently for the Discovery Center and the Transit Center for the convenience and comfort of the users. At the Discovery Center, administration of the questionnaires took place over the course of one day in September. September was chosen due to the fact that it is a time when the naturalistic landscape is at a peak of aesthetic interest. The day, September ninth, was chosen because the Discovery Center was holding a popular event on Lewis and Clark. The popular event helped to provide an even larger visitor base than the Discovery Center typically has on a weekend. Copies of the survey questionnaire were disbursed to the respondents, or visitors, employees, and volunteers, at a table as they either entered or exited the site. Completed questionnaires were returned to the table. There was a 100% response rate with thirty-two returned questionnaires.

The Transit Center's survey questionnaires were also administered in September when the naturalistic landscape was at a peak in aesthetic interest. The survey questionnaire was sent to Lee Kellenberger, the contact at the Transit Center for the Johnson County Stormwater Management Program, who created an online form of the questionnaire and disbursed the link to the employees of the Transit Center. In so doing, the respondents were able to fill out the questionnaire at their leisure. When the questionnaires were complete, Lee returned the completed survey questionnaires to the author. The total number of e-mailed questionnaires was not known, but 29 were questionnaires were returned for coding and analysis.

### **Analysis of Data**

The answers to the questionnaires were coded either with a numeric value or left as an open-ended response that would be analyzed. Analysis of the survey data was completed using three different functions to determine patterns and meaning toward the understanding of the respondents' preferences. After the two sets of data were analyzed, they were compared to each other to identify any similarities or differences.

Microsoft Excel was used to code the completed questionnaires. The questions were used as column headings and the individual questionnaire numbers were used to identify the row.

Each closed ended question was coded using numeric values (see Table 3.1). For example, if the answer was “yes” the code was a “1” and if the answer was “no”, the code was “0”, and so on, for all close-ended questions. The open-ended questions coded as a numeric value were those that could be ranked on a 5-point scale (see Table 3.1). The question asking for the user to define native plants can be used as an example. If the user clearly knew what a native plant was, the answer was coded as a “5”, meaning they highly understood. If the user did not know what a native plant was, the answer was coded as a “0”, meaning they had no understanding of what a native plant was. Other open-ended questions were left without coding and were used as an enhancement for the analysis process.

**Table 3.1 Coding Description**

	Questionnaire Answer	Numeric Value for Coding
Close Ended Questions	Yes	1
	No	0
Open Ended Questions	Complete Understanding	5
	Understanding	4
	Both Understanding and Non-Understanding	3
	Non-Understanding	2
	Complete Non-Understanding	1

Microsoft Excel was also used in the analysis process. Determining the average of ratings was completed using the Average function, as in the questions asking the ratings for overall preference, preference for certain characteristics, and ratings for the level of safety. The Mode function was an integral tool in determining the most often chosen answer, as in the questions asking the frequency of visitation, the season most preferred, and the most popular age range. The Microsoft Excel functions were used to analyze the data so that relationships and patterns could be inferred.

Correlation analysis was performed on the data to determine which aspects of the respondents’ level of preferences for individual characteristic of naturalistic landscapes, their background, their education, their values and their activities affected the overall preference for the naturalistic landscapes. An example of this correlation analysis was comparing the educational background to the overall preference for naturalistic landscapes to determine if it

positively, negatively, or did not affect the overall preference. The results of the correlation analysis illustrated whether a data set was linearly related to preference levels. If the correlation factor was from one to 0.35 the data set was linearly related to aesthetic preference levels in a positive way. If the correlation factor was from zero to 0.35, the data set was not linearly related to aesthetic preference levels and if the correlation factor was negative, the data set would be negatively related, whether linearly or not, to aesthetic preference levels.

Statistical t-Test analysis was run in conjunction with the other Microsoft Excel analysis tool to determine if certain data sets influenced the respondents' aesthetic preference levels. The use of the t-Test allowed for comparisons of mean values that were deemed statistically significant when the t-Statistic was greater than the Critical t-Statistic for the sample sizes degree of freedom and level of confidence. A level of confidence of 5% ( $\alpha=0.05$ ) was used for all t-Tests in this study. By using a confidence level of 5%, it can be said that the difference in mean values for the samples tested had a 5% or less probability of occurring by chance alone. Statistical t-Tests were run on data sets for questions pertaining to landscape characteristics in the respondents' home landscapes and for questions pertaining to the respondents' ideal landscape characteristics.

After compiling the information from the data analysis of the two sites, the information was compared. The information from each site was not only compared to each other but to the results from previous preference studies. If the information gathered from the two sites and from previous preference studies was similar, it could be inferred that the cause of the similarity was representative of the people in the Mid-west. When all of the comparison analysis was completed, conclusions were drawn and recommendations were made.

## CHAPTER 4 - Results

Chapter 4 illustrates the data from questionnaires administered at the Anita B. Gorman Discovery Center and the Johnson County Transit Center. The first section, termed Site, uses text and tables to illustrate the overall preference levels and factors that help to further define those preferences. To do so, those factors are compared to the overall preferences to determine if correlations exist. The second section, termed Respondents, focuses on the background characteristics of the respondents. Background characteristics and values are used in comparison with the preference levels for the naturalistic landscapes to determine which characteristics are correlated with and influence preference levels.

### Site

#### *Anita B. Gorman Discovery Center*

At the Discovery Center the results are reported for the two naturalistic landscape spaces. The first is the parking lot landscape and the second is the prairie landscape.

The parking lot landscape was highly preferred by the respondents and received a high average preference rating of 4.34 on a 5-point scale (see Table .1). Respondents were asked to rate their level of preference for each of the characteristics of beauty, naturalness, order, color, and safety on a 5-point scale. Beauty, or how beautiful the respondent found the landscape, received an average rating of 3.91 (see Table 4.1). Naturalness received an average rating of 4.4, order received an average rating of 3.47, and color received a rating of 4.00. The level of safety the respondent felt while using the space received an average rating of 3.81 (see Table 4.2).

Although the average perceived level of safety is lower than the other characteristics, Safety is found to be linearly related to preference levels. The linear relationship is identified by a correlation factor of 0.35 and higher. Safety's relationship to preference levels for the parking lot landscape has a correlation factor of 0.64 and is therefore linearly related (see Table 4.2).

The prairie landscape was also highly preferred by the respondents and earned a high average preference rating of 4.41 on a 5-point scale (see Table 4.1). Beauty received an average rating of 4.13, naturalness received an average rating of 4.41 and color received a rating of 4.00 (see Table 4.1). The level of safety the respondent felt while using the space received an average rating of 3.91 (see Table 4.2). Perceived safety and preference levels are further illustrated with a

correlation factor of 0.35 for the prairie landscape (see Table 4.2). The lower correlation factor for the prairie landscape in comparison to the parking lot landscape could be due to the smaller differences in the average preference levels. Table 4.2 illustrates the levels of perceived safety and their corresponding preference levels. As the level of safety increases, so does the corresponding preference level. Some negative comments concerning safety focused on the fact that the lush plantings could lead to hiding places for bugs, snakes, and other small animals. Many people may perceive these elements as negative. Average preference ratings for the parking lot landscape as related to the level of perceived safety are very similar to the ones for the prairie landscape.

**Table 4.1 Level of Overall Preference, Beauty, Naturalness, Order, Color and Safety for Both Naturalistic Landscapes (Discovery Center)**

	Level of Characteristics	
	Parking Lot 1=low, 5=high)	Prairie 1=low, 5=high)
Overall Preference Level	4.34	4.41
Beauty	3.91	4.13
Naturalness	4.47	4.41
Order	3.47	3.72
Color	4.00	4.00
Safety	3.81	3.91

**Table 4.2 Level of Perceived Safety and Corresponding Preferences for Both Naturalistic Landscapes and How They Relate to Each Other (Discovery Center)**

Level of perceived Safety	N (Sample Size)	Parking Lot	Prairie
		Avg. Preference (1=low, 5=high)	Avg. Preference (1=low, 5=high)
1 (low)	0	n/a	n/a
2	5	3.20	3.80
3 (neutral)	10	4.10	4.30
4	3	5.00	4.33
5 (high)	14	4.79	4.71
Correlation factor		0.64	0.35

Overall, respondents rated the spaces as having high average levels of preference, beauty, naturalness, and color. Respondents gave order a moderate rating. The overall safety rating was high and was found to be a significant influence on and linearly related to preference levels.

***Johnson County Transit Center***

At the Transit Center, results are reported for a single naturalistic landscape. The naturalistic landscape at the Transit Center was not highly preferred by the respondents and earned a low average preference rating of 2.34 on a 5-point scale. Beauty received an average rating of 2.31, naturalness received an average rating of 3.00, order received an average rating of 2.03, and color received a rating of 2.83 (see Table 4.3). The level of safety the respondent felt while using the space received an average rating of 2.43 (see Table 4.4). One comment regarding safety stated that, “Although we all like to see wildlife there is some I don't want near an area of entrance the building I work in. Landscape is too tall near street entrance and you have to pull out fairly far to see oncoming traffic from the North.” Other respondents echoed this general statement. The connection between the overall preference level and safety was further supported using correlation analysis. The correlation factor between safety and preference was 0.91, which suggests that as the feeling of safety increases, so does the level of preference (see Table 4.4). In this case, the preference levels not only increase as the level of perceived safety increases, but they increase by fairly large increments (see Table 4.4).

**Table 4.3 Level of Overall Preference, Beauty, Naturalness, Order, Color and Safety for the Naturalistic Landscape (Transit Center)**

	Level of characteristic (1=low, 5=high)
Overall Preference Level	2.34
Beauty	2.31
Naturalness	3.00
Order	2.03
Color	4.00
Safety	2.45

**Table 4.4 Level of Perceived Safety and Corresponding Preferences for the Naturalistic Landscape and How They Relate to Each Other (Transit Center)**

Level of perceived Safety	N (Sample Size)	Avg. Preference (1=low, 5=high)
1 (low)	7	1
2	13	1.77
3 (neutral)	1	3.00
4	5	4.20
5 (high)	3	4.67
Correlation Factor		0.91

In summation, the Transit Center received low ratings for the characteristics composing the naturalistic landscape. Respondents found the space un-natural, low in order, low in color, and not beautiful. Additionally the majority of respondents felt unsafe while exploring the site. Respondents particularly took issue, in terms of safety, with the presence of small creatures, such as snakes and rodents, hiding in the lush foliage and the interruption of a clear sight line of oncoming traffic.

## **Respondents**

### ***Anita B. Gorman Discovery Center***

Users attending the Discovery Center are composed primarily of casual visitors, conservationist employees, or people attending the Discovery Center to lead and attend seminars, classes, or other activities. The majority of respondents indicated that their most common frequency of visitation to the Discovery Center was yearly. If the most common visitation is yearly visitation, it indicates that most respondents are visitors and not employees because most employees would be at their job more than once a year. Backgrounds of the respondents vary widely and have differing effects on the resulting preference for the two naturalistic landscapes.

Age of the respondents at the Discovery Center was quite varied. The most common age range was 51 to 65, with 18 of the 32 respondents in that category. The other categories and corresponding percentage of respondents are as follows: 6.3% were 18 to 24, 3.13% were 25 to 35, and 34.38% were 36 to 50. As seen in Table 4.5, respondent's ages and their preference levels for the parking lot landscape are not linearly related with a correlation factor of 0.07. Table 4.5 illustrates that all age groups for the parking lot landscape have preference levels of 4

and above, which explains that no matter the age range, respondents at the Discovery Center prefer the naturalistic parking lot landscapes. The same can be seen in Table 4.6 for the native prairie landscape. Therefore, it is appropriate to assume that for this respondent group and site, that age does not have a significant effect on preference levels.

**Table 4.5 Age Ranges and Corresponding Preferences for the Parking Lot Landscape and How They Relate to Each Other (Discovery Center)**

Age Range	N (Sample Size)	Avg. Preference (1=low, 5=high)
18-24	2	4.5
25-35	1	5
36-50	11	4
51-65	18	4.5
Correlation Factor		0.07

**Table 4.6 Age Ranges and Corresponding Preferences for the Native Prairie Landscape and How They Relate to Each Other (Discovery Center)**

Age Range	N (Sample Size)	Avg. Preference (1=low, 5=high)
18-25	2	5
25-35	1	5
36-50	11	4.27
51-65	18	4.39
Correlation Factor		-0.16

The type of place where the individual respondents grew up varied slightly. The most common place-type was suburban, with 46.88% of the respondents in that category. Respondents that grew up in rural areas accounted for 21.88% and those that grew up in urban areas accounted for 31.25%. As seen in Table 4.7, the place-type where respondents grew up and their preference levels for the parking lot landscape are not linearly related with a correlation factor of -0.15 (see Table 4.7). Table 4.7 illustrates that the respondent group who grew up in metro place-types had the highest average preference level of 4.6 on a 5-point scale. As seen in Table 4.7, for the parking lot landscape, each place-type in which respondent grew up had an average preference rating of 4.2 or higher, meaning they have a high preference. The prairie landscape's results differ slightly from those of the parking lot landscape.

**Table 4.7 Place-Type where Respondents Grew Up and Corresponding Preferences for the Parking Lot Landscape and How They Relate to Each Other (Discovery Center)**

Place-Type	N (Sample Size)	Avg. Preference (1=low, 5=high)
Metro	10	4.6
Suburban	15	4.2
Rural	7	4.29
Correlation Factor		-0.15

The place-type where respondents grew up and their preference levels for the native prairie landscape are not linearly related with a correlation factor of -0.04 (see Table 4.8). Results from the native prairie landscape, see Table 4.8, illustrate that the respondent group that grew up in Metro areas has the highest preference level of 4.6. Each place-type from which respondents grew up had an average preference rating of 4.2 or higher, which illustrates a high preference. The high levels of preference from all respondents illustrate that the place-type a respondent grew up in does not significantly influence preference levels for the native prairie landscape.

**Table 4.8 Place-Type where Respondents Grew Up and Corresponding Preferences for the Native Prairie Landscape and How They Relate to Each Other (Discovery Center)**

Place-Type	N (Sample Size)	Avg. Preference (1=low, 5=high)
Metro	10	4.6
Suburban	15	4.2
Rural	7	4.57
Correlation Factor		-0.04

Place-types where the respondents currently live are less varied than the place-types where they grew up. Suburban locations are also the most common for this category, with 16 of the 32 respondents (50%) residing in suburban locations. Only one of the 32 respondents lives in a rural location. The remaining fifteen respondents (47%) live in a metro place-type. The place-type in which a respondent currently lives is not linearly related to their preference level for the parking lot landscape with a correlation factor of -0.07 (see Table 4.9). The respondent group with the highest average preference level of 4.4 is the group that lives in a metro location. As

seen in Table 4.9, the lowest average preference rating is 3.81, which illustrates that most respondents have a positive preference for the parking lot landscape no matter the place-type in which they live.

**Table 4.9 Place-Type where Respondents Live and Corresponding Preferences for the Parking Lot Landscape and How They Relate to Each Other (Discovery Center)**

Place-Type	N (Sample Size)	Avg. Preference (1=low, 5=high)
Metro	15	4.4
Suburban	16	3.81
Rural	1	4
Correlation Factors		-0.07

The place-type in which a respondent lives is not linearly related to their preference level for the native prairie landscape. The correlation factor for the two groups of data is 0.04, further illustrating that there is no linear relationship between where the respondent lives and their preference level for the native prairie landscape (see Table 4.10). Table 4.10 illustrates that the respondent living in a rural place-type has the highest average preference level of 5, which may explain that of the places respondents live, those that live in rural locations are likely to have higher average preference levels. Because only one respondent lives in a rural location, the results may not be representative.

**Table 4.10 Place-Type where Respondents Live and Corresponding Preferences for the Native Prairie Landscape and How They Relate to Each Other (Discovery Center)**

Place-Type	N (Sample Size)	Avg. Preference (1=low, 5=high)
Metro	15	4.4
Suburban	16	4.38
Rural	1	5
Correlation Factor		0.04

The residences where respondents live contain different types of landscape elements, which may include, but are not limited to, turf, native grass, non-native perennials, annual beds, native forbs, native shrubs, ornamental shrubs, native trees, and ornamental trees. The landscape

elements' occurrence at the residence of the respondent is compared to the preference levels for the parking lot landscape and the prairie landscape, in Table 4.11. For the comparison, the occurrence of the elements was separated into two groups. The first is where the landscape element is not in the respondent's home landscape and the second is where the landscape element is in the respondent's home landscape. Within the two groups, the corresponding respondents' preference levels were averaged to determine the average preference compared to the existence of the element. To further determine if the existence or non-existence of the element in the respondents' home landscapes influences preference levels, statistical t-Test analysis was run on all the landscape characteristics. If the t-Statistic is greater than or equal to the Critical t-Statistic, then the element's existence or non-existence is an indicator of aesthetic preference levels. Table 4.11 illustrates that the existence or non-existence of annual beds and native forbs in respondents' home landscapes is an influence on aesthetic preference levels. Table 4.11 also illustrates that when annual beds and native forbs exist in the landscape the respondent is more likely to have a higher level of preference than they would if the characteristic does not exist. Other elements may have different average preference levels between the no group and the yes group but the statistical t-test analysis illustrates that those differences do not have significant influence on aesthetic preference levels.

**Table 4.11 Significance of the Existing Landscape Elements and Corresponding Preferences for Both Naturalistic Landscapes (Discovery Center)**

Landscape Characteristic	Landscape	Existence	N (Sample Size)	Avg. Preference (1=low, 5=high)	t-Stat	>,<>=	Critical t-Stat	Significance
Turf	Parking Lot	No	2	4	0.36	<	6.31	No
		Yes	30	4.37				
	Prairie	No	2	4.5	0.19	<	6.31	No
		Yes	30	4.4				
Native Grasses	Parking Lot	No	22	4.23	1.26	<	1.71	No
		Yes	10	4.6				
	Prairie	No	22	4.32	0.99	<	1.72	No
		Yes	10	4.6				
Perennials	Parking Lot	No	12	4.33	0.05	<	1.71	No
		Yes	20	4.35				
	Prairie	No	12	4.17	1.23	<	1.73	No
		Yes	20	4.55				
Annual Beds	Parking Lot	No	20	4.15	1.84	>	1.7	Yes
		Yes	12	4.67				
	Prairie	No	20	4.2	2.3	>	1.7	Yes
		Yes	12	4.75				
Native Forbs	Parking Lot	No	22	4.14	2.41	>	1.71	Yes
		Yes	10	4.8				
	Prairie	No	22	4.23	2.51	>	1.7	Yes
		Yes	10	4.8				
Native Shrubs	Parking Lot	No	24	4.25	1.41	<	1.71	No
		Yes	8	4.63				
	Prairie	No	24	4.29	1.53	<	1.76	No
		Yes	8	4.75				
Ornamental Shrubs	Parking Lot	No	20	4.3	0.34	<	1.73	No
		Yes	12	4.42				
	Prairie	No	20	4.35	0.54	<	1.7	No
		Yes	12	4.5				
Native Trees	Parking Lot	No	12	4.42	0.38	<	1.71	No
		Yes	20	4.3				
	Prairie	No	12	4.08	1.72	<	1.73	No
		Yes	20	4.6				
Ornamental Trees	Parking Lot	No	19	4.42	0.59	<	1.71	No
		Yes	13	4.23				
	Prairie	No	19	4.42	0.13	<	1.7	No
		Yes	13	4.38				

Along with the types of elements that make up a respondent's landscape, as in turf, native grasses, perennials, annual beds, native forbs, etc., there are landscape characteristics that the respondent finds most important. The ideal landscape characteristics provided in the questionnaire include, low maintenance, low water needs, a neat and tidy appearance, a manicured lawn, and sustainability, or the ability for the landscape to perpetuate itself with little added water and maintenance. Even though all ideal landscape characteristics led to high preference levels, some led to consistently higher preference levels. Sustainability will be used as the example. The respondent group that found sustainability to be an ideal landscape characteristic possessed higher average preference levels for both naturalistic landscape spaces at the Discovery Center. Table 4.12 not only illustrates that the respondents have high preference levels no matter which characteristics they find most important, but of the important characteristics, only sustainability is a significant indicator of preference levels. Statistical t-test analysis was run on the preference levels associated with the ideal landscape characteristics. The results further indicate that sustainability is the only ideal landscape characteristic that has a significant influence on aesthetic preference levels because the t-Statistic is greater than the Critical t-Statistic. Along with where the respondents grew up, live, and the characteristics of their personal landscapes, the factors that comprise the personal backgrounds in education and activities provide insight into respondents' preference levels.

**Table 4.12 Significance of the Ideal Landscape Characteristics and Corresponding Preferences for Both Naturalistic Landscapes (Discovery Center)**

Ideal Landscape Characteristic	Landscape	Existence	N (Sample Size)	Avg. Preference (1=low, 5=high)	t-Stat	>,<=	Critical t-Stat	Significance
Low Maintenance	Parking Lot	No	13	4.62	1.54	<	1.7	No
		Yes	19	4.16				
	Prairie	No	13	4.46	0.31	<	1.71	No
		Yes	19	4.37				
Low Water Needs	Parking Lot	No	22	4.45	0.99	<	1.75	No
		Yes	10	4.1				
	Prairie	No	22	4.41	0.03	<	1.74	No
		Yes	10	4.4				
Neat and Tidy Appearance	Parking Lot	No	22	4.32	0.25	<	1.73	No
		Yes	10	4.4				
	Prairie	No	22	4.32	1.12	<	1.7	No
		Yes	10	4.6				
Manicured Lawn	Parking Lot	No	22	4.32	0.25	<	1.73	No
		Yes	10	4.4				
	Prairie	No	2	4.45	0.46	<	1.76	No
		Yes	10	4.3				
Sustainability	Parking Lot	No	21	4.14	2.31	>	1.7	Yes
		Yes	11	4.73				
	Prairie	No	21	4.24	1.84	>	1.71	Yes
		Yes	11	4.73				

Table 4.13 illustrates the highest level of formal education the respondents have completed, which include a high school diploma, some college classes, a bachelor’s degree, or a master’s and/or a doctoral degree. At the Discovery Center, most respondents have achieved a Bachelor’s degree. Even though most respondents have a Bachelor’s degree, it can be seen in Table 4.13 that regardless of the level of formal education achieved, the average preference levels are medium to high. The level of formal education does not linearly affect the respondents’ preference levels. Instead, it can be seen, in Table 4.13, that those respondents with only a high school diploma have the highest average preference level. The non-linear response is further illustrated with correlation factors less than 0.1 for the parking lot landscape and the native prairie landscape (see Table 4.13).

**Table 4.13 Amount of Formal Education and Corresponding Preferences for Both Naturalistic Landscapes and How They Relate to Each Other (Discovery Center)**

Amount of Formal Education	N (Sample Size)	Parking Lot	Prairie
		Avg. Preference (1=low, 5=high)	Avg. Preference (1=low, 5=high)
High School	3	5.00	4.67
Some College	5	3.60	4.20
Bachelor's Degree	15	4.33	4.47
Master's Degree, Doctoral Degree, Law School, etc.	9	4.56	4.33
Correlation Factor		0.07	-0.05

In addition to formal education, the participation in extra classes and seminars relevant to naturalistic landscapes is examined to determine their affect on preference levels. Table 4.14 illustrates that most respondents have not participated in extra classes and seminars that focus on subjects relevant and related to naturalistic landscapes. Of those respondents that did participate in extra classes and seminars, their preference levels are seen to be higher for both naturalistic landscapes at the Discovery Center. Participating in extra classes and seminars that focus on topics relevant to naturalistic landscapes and their benefits has a strong positive effect on preference levels. The correlation factor associated with extra classes and preference levels is 0.19 for the parking lot landscape and 0.22 for the native prairie landscape, which suggests that the two are related, but not linearly (see Table 4.14).

**Table 4.14 Extra Classes and Seminars and Corresponding Preferences for Both Naturalistic Landscapes and How They Relate to Each Other (Discovery Center)**

Extra Classes on topics Relevant to Naturalistic Landscapes	N (Sample Size)	Parking Lot	Prairie
		Avg. Preference (1=low, 5=high)	Avg. Preference (1=low, 5=high)
Have Not Had	19	4.21	4.26
Have Had	13	4.54	4.62
Correlation Factor		0.21	-0.01

To further understand how education and knowledge affects preferences, the knowledge of native plants, their benefits to the environment, and the knowledge of sustainability are examined. The respondents’ knowledge of native plants varies greatly. Many respondents stated they have “no idea” what native plants are and others had detailed knowledge of them and their benefits. One example of a knowledgeable response to the question of “What is a native plant?” was “adapted for thousands of years in a specific locale to soil, weather, water, and wildlife interactions.” Tables 4.15 and 4.16 illustrate the levels of native plant knowledge and their benefits and how they affect the respondents’ preference levels. Table 4.15 illustrates that as the respondents’ knowledge of what native plants are increases it does not cause the level of preference to increase. A correlation factor of 0.21 for the parking lot landscape and -0.01 for the native prairie landscape further illustrate that the two data sets are not linearly related (see Table 4.15).

**Table 4.15 Native Plant Knowledge and Corresponding Preferences for Both Naturalistic Landscapes and How They Relate to Each Other (Discovery Center)**

Level of Knowledge for Native Plants	N (Sample Size)	Parking Lot	Prairie
		Avg. Preference (1=low, 5=high)	Avg. Preference (1=low, 5=high)
1 (low)	7	4.00	4.43
2	0	n/a	n/a
3 (neutral)	2	3.50	4.50
4	14	4.57	4.43
5 (high)	9	4.44	4.33
Correlation Factor		0.21	-0.01

Table 4.16 illustrates a slightly different result. For the parking lot landscape, as the level of knowledge for the benefits of native plants increases so do the average preferences. The linear relationship of the parking lot landscape is further illustrated with a correlation factor of 0.36 (see Table 4.16). The same is not seen for the native prairie landscape, where low levels of knowledge still led to high preference levels. A correlation factor of 0.14 further illustrates the non-linear relationship of the native prairie landscape (see Table 4.16).

**Table 4.16 Benefits of Native Plants and Corresponding Preferences for Both Naturalistic Landscapes and How They Relate to Each Other (Discovery Center)**

Level of Knowledge of Benefits of Native Plants	N (Sample Size)	Parking Lot	Prairie
		Avg. Preference (1=low, 5=high)	Avg. Preference (1=low, 5=high)
1 (low)	6	4.00	4.30
2	1	4.00	5.00
3 (neutral)	5	4.00	4.00
4	12	4.25	4.33
5 (high)	8	5.00	4.75
Correlation Factor		0.36	0.14

The level of knowledge of sustainability is illustrated in Table 4.17 and is much the same as the level of knowledge of native plants. Those respondents that have the highest knowledge of sustainability also have the highest preference levels. Even though the highest level of knowledge leads to the highest preference level for both naturalistic landscapes, the level of knowledge is not linearly correlated to the level of preference, which is illustrated with correlation factors of 0.01 for the parking lot landscape and 0.10 for the native prairie landscape (see Table 4.17).

**Table 4.17 Knowledge of Sustainability and Corresponding Preferences for Both Naturalistic Landscapes and How They Relate to Each Other (Discovery Center)**

Level of Knowledge for Sustainability	N (Sample Size)	Parking Lot	Prairie
		Avg. Preference (1=low, 5=high)	Avg. Preference (1=low, 5=high)
1 (low)	10	4.40	4.20
2	6	4.33	4.67
3 (neutral)	5	4.20	4.60
4	9	4.22	4.22
5 (high)	2	5.00	5.00
Correlation Factor		0.01	0.10

The activities a respondent participates in can also affect their preference levels. Illustrated in Table 4.18, those respondents that participated in green activities such as recycling, buying recycled products, buying local products, and buying organic products have higher average preference levels than those respondents that do not participate in green activities. The higher average preference levels illustrate that the activities are related to preference levels. Although all activities influence preference levels, only buying local products and buying organic products are linearly related to preference levels, and only for the parking lot landscape.

**Table 4.18 Participation in Green Activities (Recycle, Buy Recycled Products, Buy Local Products, Buy Organic Products) and Corresponding Preferences for Both Naturalistic Landscapes and How They Relate to Each Other (Discovery Center)**

Green Activity	Participate in - Yes or No	N (Sample Size)	Parking Lot		Prairie	
			Avg. Preference (1=low, 5=high)	Correlation Factor	Avg. Preference (1=low, 5=high)	Correlation Factor
Recycle	No	5	2.80	0.28	3.20	0.22
	Yes	27	4.63		4.63	
Buy Recycled Products	No	4	2.75	0.15	3.00	0.20
	Yes	28	4.57		4.61	
Buy Local Products	No	6	3.00	0.38	3.50	0.25
	Yes	26	4.65		4.62	
Buy Organic Products	No	15	3.87	0.53	4.20	0.25
	Yes	17	4.76		4.59	

Respondents that participated in outdoor activities are seen to have higher preference levels for naturalistic landscapes (see Table 4.19). The linear relationship is further illustrated

with correlation factors of 0.48 for the parking lot landscape and 0.44 for the native prairie landscape.

**Table 4.19 Participation in Outdoor Activities and Corresponding Preferences for Both Naturalistic Landscapes and How They Relate to Each Other (Discovery Center)**

Participate in Outdoor Activities	N (Sample Size)	Parking Lot	Prairie
		Avg. Preference (1=low, 5=high)	Avg. Preference (1=low, 5=high)
No	5	3.40	3.60
Yes	27	4.52	4.56
Correlation Factor		0.48	0.44

**Summary**

Overall, it was determined that respondents at the Discovery Center generally possessed high levels of preference for the two naturalistic landscapes at the site. Many of the background characteristics can be used as indicators of preference levels, even though the preference levels were generally high.

**Age**

For the Discovery Center, most respondents are visitors and fall between the ages of 51 and 65. It was found that age is not linearly correlated to preference levels and that all age ranges have positive preference levels for the naturalistic landscapes.

**Place-Types Respondents Grew Up in and Live in**

The place-type where most respondents grew up was suburban which was the place-type with the lowest preference level for the naturalistic landscapes. The place-type where most respondents live was also suburban. Overall, place-type was seen to provide a very slight insight into preference levels and it was not linearly related to preference levels.

**Landscape Elements in Respondents' Home Landscapes**

At the location where the respondents live the existence or non-existence of nine elements was examined. The elements included turf, native grasses, perennials, annual beds, native forbs, native shrubs, ornamental shrubs, native trees, and ornamental trees. At the location where the respondents live it was seen that when respondents have annual beds and native forbs

in their home landscape they have higher preference levels. Through statistical analysis it was also found that the existence or non-existence of annual beds and native forbs in the respondents' home landscapes is a significant indicator of preference levels. Besides looking at the elements present in the respondents' landscapes, the ideal landscape characteristics were examined.

### ***Ideal Landscape Characteristics***

Of the five ideal landscape characteristics of low maintenance, low water needs, neat and tidy appearance, manicured lawn, and sustainability, only one characteristic proved to be a significant indicator of preference. Statistical t-test analysis illustrated that sustainability, as an ideal characteristic, is a significant indicator of preference. If a respondent feels that sustainability is an ideal characteristic of a landscape they will have a higher preference level than a person who does not feel that sustainability is important. After examining where the respondents grew up, live and what their landscapes are like, their educational backgrounds were examined.

### ***Formal Education and the Participation in Extra Classes and Seminars***

Most respondents visiting the Discovery Center have a bachelor's degree. The level of formal education was not seen to be a strong indicator of preference as all educational backgrounds showed high preference levels. The level of formal education was not linearly related to preference levels, which further illustrates that the level of formal education is not a good indicator of preference levels. The aspect of education that was a strong indicator of preference levels was the participation in extra classes and seminars that focus on topics relevant to naturalistic landscapes. It was found that those respondents who participated in extra classes and seminars had a significantly higher level of preference for the naturalistic landscapes than those that did not participate in extra classes and seminars.

### ***Knowledge of Native Plants, of their Benefits, and of Sustainability***

The knowledge of native plants, of the benefits of native plants, and of sustainability were not found to be linearly related to preference levels. The factors were found to be slight indicators of preference levels for the respondents at the Discovery Center. The only factor that was both linearly related to and an influence of preference levels was the knowledge of the benefits of native plants, which was only for the parking lot landscape.

### ***Participation in Green Activities and Outdoor Activities***

It was found that the respondents who participated in green activities, such as recycling, buying recycled products, buying local products and buying organic products, have higher average preference levels than respondents that do not participate in green activities. All green activities are an indicator of preference, but only buying local products and buying organic products are also linearly related to preference levels for the parking lot landscape.

It was found that the respondents that participated in outdoor activities had higher preferences than those that did not, making the participation in outdoor activities a good indicator of preference levels. The participation in outdoor activities was also linearly related to preference levels.

### ***Johnson County Transit Center***

The majority of respondents attending the Transit Center answered the question about frequency of visitation to the site with daily. Daily visitation illustrates that most respondents are likely employees and may not necessarily have a direct interest in environmental conservation. Backgrounds of the respondents vary widely and show differing correlations on the resulting preference for the naturalistic landscape.

Age of the respondents varied widely. The most common age range was composed of 12 of the 29 respondents (41%) and was 36 to 50. The other categories and corresponding respondents are as follows: no respondents were 18 to 24, 13.8% were 25 to 35, 37.9% were 51 to 65, and two respondents did not answer the age range question. Respondent's ages and their preference levels for the naturalistic landscape have a correlation factor of -0.27, which means they are not linearly related. Table 4.20 illustrates that all age groups have preference levels of 2.75 and below, which shows that no matter the age range, respondents at the Transit Center do not prefer the naturalistic landscape. Therefore, it seems appropriate to assume for this respondent group and site, that age does not have a significant effect on preference levels.

**Table 4.20 Age Ranges and Corresponding Preferences for the Naturalistic Landscape and How They Relate to Each Other (Transit Center)**

Age Range	N (Sample Size)	Avg. Preference (1=low, 5=high)
18-24	0	n/a
25-35	4	2.75
36-50	12	2.75
51-65	11	1.82
No Response	2	2
Correlation Factor		-0.27

The type of place the individual respondents grew up varied slightly. The most common place-type has 10 of the 29 respondents (34%) growing up in a suburban place-type. Respondents that grew up in rural areas accounted for 21.9%, those that grew up in urban areas accounted for 27.6%, and the remaining two did not respond. The place-type which respondents grew up in and their preference levels for the naturalistic landscape are not linearly related, which is illustrated with a correlation factor of 0.13. Table 4.21 illustrates that the respondent group who grew up in suburban place-types has the highest average preference level of 3.1 on a 5-point scale. Overall, each place-type from which respondent grew up had an average preference rating of 3.1 or lower, meaning respondents have a low average preference level and that place-types where the respondent grew up may not be a strong indicator of preference levels.

**Table 4.21 Place-Type where Respondents Grew Up and Corresponding Preferences for the Naturalistic Landscape and How They Relate to Each Other (Transit Center)**

Place-Type	N (Sample Size)	Avg. Preference (1=low, 5=high)
Metro	8	1.75
Suburban	10	3.1
Rural	9	2.11
No Response	2	2
Correlation Factor		0.13

Results for place-types where the respondents currently live are similar to those for where they grew up. The most common place-type is composed of 58.6% of the respondents residing in a suburban place-type. 10.3% of respondents live in a rural location and of the remaining respondents, 24.1%, live in a metro location and two did not respond to this question. Table 4.22 illustrates that the respondent group who grew up in suburban place-types has the highest average preference level of 2.59. Each place type from which respondent grew up had an average preference rating of 2.59 or lower. The place-type in which the respondent lives is not linearly related to preference levels (0.05 correlation factor) and is not a strong indicator of preference levels, but those that live in suburban locations, on average, will have a slightly higher level of preference for the naturalistic landscape.

**Table 4.22 Place-Type where Respondents Live and Corresponding Preferences for the Naturalistic Landscape and How They Relate to Each Other (Transit Center)**

Place-Type	N (Sample Size)	Avg. Preference (1=low, 5=high)
Metro	7	2.14
Suburban	17	2.59
Rural	3	1.67
No Response	2	2
Correlation Factor		0.05

The residences where respondents live contain different types of landscape elements. The questionnaire uses the elements, native grass, non-native perennials, annual beds, native forbs, native shrubs, ornamental shrubs, native trees, and ornamental trees. The occurrence of the landscape element at the residence of the respondent are compared to the associated preference levels for the naturalistic landscape. For the comparison, the occurrences of the elements were separated into two groups. The first group is where the landscape element does not exist in the respondents' landscape and the second group is where the landscape element does exist in the respondents' landscape. Within the two groups, the corresponding respondents' preference levels were averaged to determine the mean preference level for the existence of the element. Table 4.23 illustrates that the existence and the non-existence of an element within a respondent's landscape may influence their preference levels for the naturalistic landscape. To further

determine if the existence of a landscape element influences preference levels statistical t-tests were run. If the t-Statistic is greater than, or equal to, the Critical t-Statistic, then the characteristic is a significant influence on aesthetic preference levels. Table 4.23 illustrates that the existence of perennials, ornamental shrubs, and native trees in the respondents' home landscape have a positive influence on preference levels.

**Table 4.23 Significance of Existing Landscape Elements and Corresponding Preferences for the Naturalistic Landscape (Transit Center)**

Landscape Element	Existence	N (Sample Size)	Avg. Preference (1=low, 5=high)	t-Stat	>,<=	Critical t-Stat	Significance
Turf	No	1	1.00	2.49	n/a	n/a	n/a
	Yes	26	2.42				
Native Grasses	No	23	2.26	0.62	<	2.35	No
	Yes	4	3.00				
Perennials	No	15	1.87	2.00	>	1.73	Yes
	Yes	12	3.00				
Annual Beds	No	19	2.21	0.86	<	1.77	No
	Yes	8	2.75				
Native Forbs	No	21	2.33	0.19	<	1.94	No
	Yes	6	2.50				
Native Shrubs	No	26	2.42	4.83	n/a	n/a	n/a
	Yes	1	1.00				
Ornamental Shrubs	No	16	1.81	2.47	>	1.73	Yes
	Yes	11	3.18				
Native Trees	No	10	1.60	2.49	>	1.71	Yes
	Yes	17	2.82				
Ornamental Trees	No	20	2.20	0.97	<	1.81	No
	Yes	7	2.86				
*Note - For Non-responses N=2 for all Characteristics							

Along with the types of elements that make up a respondent's landscape, there are the landscape characteristics that respondents find most important. The landscape characteristics included on the questionnaire for the respondents to identify as important or not important

include, low maintenance, low water needs, a neat and tidy appearance, a manicured lawn, and sustainability. Results of the ideal landscape characteristics can be seen in Table 4.24 and illustrate that whether the respondents found the characteristic important or not important, the average preference levels were mostly low. In conjunction with illustrating average preference levels, Table 4.24 also shows the results from running statistical t-Test analysis. Results indicate that none of the ideal landscape characteristics have a significant influence on preference levels even though average preference levels may be different.

**Table 4.24 Significance of Ideal Landscape Characteristics and Corresponding Preferences for the Naturalistic Landscape (Transit Center)**

Ideal Landscape Characteristic	Existence	N (Sample Size)	Avg. Preference (1=low, 5=high)	t-Stat	>,<=	Critical t-Stat	Significance
Low Maintenance	No	18	2.17	0.91	<	1.77	No
	Yes	9	2.77				
Low Water Needs	No	26	2.31	5.79	n/a	n/a	n/a
	Yes	1	4.00				
Neat and Tidy Appearance	No	19	2.58	1.30	<	1.73	No
	Yes	8	1.88				
Manicured Lawn	No	20	2.55	1.20	<	1.76	No
	Yes	7	1.86				
Sustainability	No	25	2.28	0.80	<	6.31	No
	Yes	2	3.50				
*Note - For Non-responses N=2 for all Characteristics							

Along with where the respondents grew up, live, and the characteristics of their personal landscapes, the factors that comprise the personal backgrounds in education and activities provide insight into their preference levels. Table 4.25 illustrates the highest level of formal education the respondents have completed, which include a high school diploma, some college classes, a bachelor’s degree, or a master’s and/or a doctoral degree. For the naturalistic landscapes at the Transit Center, the level of formal education linearly affects the respondents’ preference levels. As the respondents’ level of formal education increases, so do their average preference levels. The linear relationship is further illustrated with a correlation factor of 0.56

(see Table 4.25). It can be seen that the average preference levels go from 1.62 for a high school diploma to 4 for those with a master’s degree or higher. The small number of respondents with a master’s degree or higher may mean that the results are not as representative as they could be if there was a larger sample size.

**Table 4.25 Amount of Formal Education and Corresponding Preferences for the Naturalistic Landscape and How They Relate to Each Other (Transit Center)**

Amount of Formal Education	N (Sample Size)	Avg. Preference (1=low, 5=high)
High School	13	1.62
Some College	6	2.17
Bachelor's Degree	8	3.25
Master's Degree, Doctoral Degree, Law School, etc.	2	4.00
Correlation Factor		0.56

In conjunction with formal education, the participation in extra classes and seminars is examined to determine their affect on preference levels. Table 4.26 illustrates that just over half of the respondents have not participated in extra classes and seminars that focus on ecology, environmental aspects, sustainability, and other topics related to naturalistic landscapes. Of those respondents that did participate in extra classes and seminars, their preference levels are seen to be higher for the naturalistic landscape, which suggests that taking or participating in extra classes and seminars has a positive affect on preference levels. The correlation factor associated with extra classes and preference levels is 0.28 for the Naturalistic Landscape, which illustrates that the two are related, but not linearly (see Table 4.26).

**Table 4.26 Extra Classes and Seminars and Corresponding Preferences for the Naturalistic Landscape and How They Relate to Each Other (Transit Center)**

Extra Classes on Topics Relevant to Naturalistic Landscapes	N (Sample Size)	Avg. Preference (1=low, 5=high)
Have Not Had	13	2.15
Have Had	12	2.75
Non Responses	4	n/a
Correlation Factor		0.56

To further understand how education and knowledge affects preferences, the knowledge of native plants, their benefits to the environment, and the knowledge of sustainability are examined. The respondents’ knowledge of native plants varies greatly. Many respondents said they have no idea what native plants are and others had detailed knowledge of them and their benefits. One example of a knowledgeable response to the question of “What is a native plant?” was “a native plant is one that develops and occurs naturally, or has existed for many years in an area. These can be trees, flowers, grasses or any other plants. Some of them may have adapted to a very limited range. They may have adjusted to living in unusual environments or under very harsh climates or exceptional soil conditions. Although some types of plants for these reasons exist only within a very limited range, others can live in diverse areas or by adaptation to different surroundings.” An example of an unknowledgeable response was “I don’t know.” Tables 4.27 and 4.28 illustrate the levels of native plant knowledge and their benefits and how they affect the respondents’ preference levels. Table 4.27 illustrates that as the respondents’ knowledge of native plants increases, the average preference levels also increase. A correlation factor of 0.40 for the naturalistic landscape further illustrates that the two data sets are linearly related. Table 4.28 illustrates a slightly different result for the naturalistic landscape, as the level of knowledge for the benefits of native plants increases the average preference levels do not appear to increase, but the correlation factor, which is 0.54, describes a linear relationship. Therefore, knowledge of the benefits of native plants is a significant indicator of preference levels.

**Table 4.27 Native Plant Knowledge and Correlating Preferences for the Naturalistic Landscape and How They Relate to Each Other (Transit Center)**

Level of Knowledge for Native Plants	N (Sample Size)	Avg. Preference (1=low, 5=high)
1 (low)	2	1.00
2	2	2.00
3 (neutral)	2	2.00
4	9	3.11
5 (high)	3	3.67
Non responses	11	n/a
Correlation Factor		0.4

**Table 4.28 Knowledge of Benefits of Native Plants and Correlating Preferences for the Naturalistic Landscape and Hoe They Relate to Each Other (Transit Center)**

Level of Knowledge of Benefits of Native Plants	N (Sample Size)	Avg. Preference (1=low, 5=high)
1 (low)	3	1.00
2	0	n/a
3 (neutral)	0	n/a
4	7	3.14
5 (high)	8	3.00
Non Responses	11	n/a
Correlation Factor		0.54

The level of knowledge of sustainability is illustrated in Table 4.29 and is similar to the results found for the level of knowledge of native plants. The level of knowledge of sustainability is linearly correlated to the average preference levels, which is further illustrated with a correlation factor of 0.64. The linear relationship aids in illustrating that the knowledge of sustainability is a significant indicator of preference levels.

**Table 4.29 Knowledge of Sustainability and Corresponding Preferences for the Naturalistic Landscape and How They Relate to Each Other (Transit Center)**

Level of Knowledge of Sustainability	N (Sample Size)	Avg. Preference (1=low, 5=high)
1 (low)	3	2.00
2	1	5.00
3 (neutral)	4	2.50
4	6	2.67
5 (high)	2	4.00
Non Responses	13	n/a
Correlation Factor		0.64

The activities a respondent participates in can also affect their preference levels. Table 4.30 illustrates green activities such as recycling, buying recycled products, buying local products and buying organic products. The participation in all of the green activities but buying organic products leads to higher preference levels, which means that they are indicators of preference levels. Even though green activities are influences of preference levels, none are linearly related to preference levels.

**Table 4.30 Participation in Green Activities (Recycle, Buy Recycled Products, Buy Local Products, and Buy Organic Products) and Corresponding Preferences for the Naturalistic Landscape and How They Relate to Each Other (Transit Center)**

Green Activity	Participate in - Yes or No	N (Sample Size)	Avg. Preference (1=low, 5=high)	Correlation Factor
Recycle	No	5	1.20	0.32
	Yes	22	2.64	
Buy Recycled Products	No	6	1.33	0.01
	Yes	21	2.67	
Buy Local Products	No	7	1.43	0.31
	Yes	20	2.70	
Buy Organic Products	No	13	2.62	0.16
	Yes	14	2.14	

\*Note - For Non-responses N=2 for all Activities

Respondents that participated in outdoor activities are seen to have higher preference levels for naturalistic landscapes (see Table 4.31). The average preference levels for those that do

and do not participate in outdoor activities are linearly related with a correlation factor of 0.36. The linear relationship and the large difference in the two average preference levels illustrate that the participation in outdoor activities is a significant indicator of preference levels.

**Table 4.31 Participation in Outdoor Activities and Corresponding Preferences for the Naturalistic Landscape and How They Relate to Each Other (Transit Center)**

Participate in Outdoor Activities	N (Sample Size)	Avg. Preference (1=low, 5=high)
No	5	1.60
Yes	18	2.89
Non Responses	6	n/a
Correlation Factor		0.36

***Summary***

Overall, it was found that the respondents at the Transit Center possessed low levels of preference for naturalistic landscape at the site. Even though the overall preference level was low, many of the background characteristics of the respondents are significant influences of preference levels.

***Age***

For the Transit Center, most respondents are employees and are between the ages of 36 and 50. It was found that age is not an influence of, or linearly correlated to preference levels and that all age ranges have low preference levels for the naturalistic landscape.

***Place-Types Respondents Grew Up in and Live in***

The place-type where most respondents grew up was suburban which was the place-type with the highest preference level for the naturalistic landscape. The place-type where most respondents live is the same as where they grew up. Overall, place type was seen to provide little insight into preference levels.

### ***Landscape Elements in Respondents' Home Landscapes***

At the location where the respondents live the existence or non-existence of nine elements was examined. The elements included turf, native grasses, perennials, annual beds, native forbs, native shrubs, ornamental shrubs, native trees, and ornamental trees. It was seen that when the respondent had native trees, ornamental shrubs and perennials in their personal landscape their average preference levels were higher. It was also found that the existence and non-existence of those elements were significant indicators of preference levels. Besides looking at the elements present in the respondents' landscapes the most important aspects of landscapes were also examined.

### ***Ideal Landscape Characteristics***

The five ideal landscape characteristics examined were low maintenance, low water needs, neat and tidy appearance, manicured lawn, and sustainability. It was found that low water needs, low maintenance, and sustainability were characteristics that led to higher average preference levels. It was also found that the respondent group that found turf not to be an important characteristic had a higher average preference level than the group that found a manicured lawn to be an important characteristic. No matter the differences in average preference levels, statistical analysis proves that none of the ideal characteristics are significant influences on preference levels. After examining where the respondents grew up, live and what their landscapes are like, their educational backgrounds were examined.

### ***Formal Education and the Participation in Extra Classes and Seminars***

Most respondents attending the Transit Center have a high school diploma and the level of formal education was seen to be a strong indicator of preference and it was linearly related. As the level of formal education increases, so do the preference levels. The participation in extra classes and seminars that focus on topics relevant to naturalistic landscapes was also found to be an indicator of, and linearly related to preference levels.

### ***Knowledge of Native Plants, of their Benefits, and of Sustainability***

A higher level of knowledge of native plants, the benefits of native plants and sustainability are linearly related to preference levels and are significant indicators of preference

levels. The level of knowledge of native plants, the benefits of native plants and sustainability are also linearly correlated to preference levels.

### ***Participation in Green Activities and Outdoor Activities***

The participation in green activities such as recycling, buying recycled products and buying local products are influences on preference levels. Buying organic products was a green activity that was not found to be an influence of preference levels. None of the green activities are linearly related to preference levels.

It was found that those respondents that participated in outdoor activities had higher preference levels than those that did not, making this a good indicator of preference. The participation in outdoor activities was also seen to be linearly related to preference levels. Using the results from both study sites, conclusions and recommendations are presented.

## **CHAPTER 5 - Conclusions and Recommendations**

Based on results from the analysis of the survey questionnaires, patterns were identified. The results from the survey questionnaires and the identified patterns suggest weaknesses in the questionnaire and in the study design. The discerned patterns and weaknesses were used to provide recommendation.

### **Patterns Drawn from Survey Responses**

Two overarching patterns were identified after analyzing the responses to the survey questionnaires. The first pattern was the differing overall preference levels at the two study sites. The second pattern was the similarities between the results of this study and the results of previously completed studies.

#### ***Difference in Overall Preference Levels at the Discovery Center and the Transit Center***

The two sites were found to have very different preference levels. The naturalistic landscapes at the Discovery Center were highly preferred by most respondents. Most respondents disliked the naturalistic landscape at the Transit Center. The reasons behind the differing preference levels could be due to many factors such as the aesthetic characteristics of the sites, the purposes for attending the sites, the difference in the overall levels of perceived safety or the education levels of the respondents.

#### ***Aesthetic Characteristics of the Sites***

The aesthetic characteristics of the two sites differ and therefore could be a cause for the differences in overall preference levels between the two sites. Chapter Two reported on aesthetic characteristics and factors used to design a naturalistic landscape. According to Gustaaf van der Hoven (1977), color is an important factor in developing a naturalistic landscape. At the Discovery Center color is provided through combining plant species that contain a lot of color, such as native forbs and native woody species that change color in the early fall. At the Transit Center there was a lack of color due to the use of primarily native grass species. The use of color at the Discovery Center and the lack of color at the Transit Center could be a cause for higher overall preference levels at the Discovery Center and lower overall preference levels at the Transit Center.

Gustaaf van der Hoven (1977) also explained that a mixture of textures should be used when designing a naturalistic landscape. The Discovery Center's naturalistic landscapes combine a wide range of textures through the use of broad-leaved native forbs species and native woody plant species, which creates a landscape that has a pleasant mix of textures. The naturalistic landscape at the Transit Center is composed of mainly native grass species with some native forb species and native woody species. While there is a mix of textures, the mix is primarily composed of finer textured grasses, which creates a landscape that lacks textural variety. The higher level of textural variety at the Discovery Center and the lower level of textural variety at the Transit Center could be a cause for the differences in overall preference levels at the two sites.

Orderly frames, or buffers, that surround naturalistic landscapes were described by Joan Nassauer in "Messy Ecosystems, Orderly Frames" (1995), and were reported on in Chapter Two. Both of the study's sites contain buffers. At the Discovery Center the buffers are not continuous but appear intentional and are well maintained as to create a sense of care for the space. The Transit Center also contains buffers along the edges of the naturalistic landscape. The Transit Center's buffers are continuous but are not well maintained. There are areas where the buffer is almost non-existent. The difference in the aesthetics and maintenance of the buffers at the study's two sites may be another cause for the difference in overall preference levels at the two sites.

While the three previously mentioned aesthetic characteristics could be seen to influence the difference in overall preference levels at the two sites, the last characteristic may be the most likely. The overgrown buffers and lack of maintenance has created a space that does not illustrate a sense of care and purpose and may provide opportunities for small animals and insects to come into contact with the people using the site. A sense of care and purpose may be subjective, but they provide enough evidence to support that the last aesthetic characteristic is the most important.

### ***Purpose for Attending the Sites***

The reasons behind the difference in preference levels could be due to the difference in the purpose for the respondents attending the sites and the backgrounds of the respondents. For the Discovery Center, the respondents were either conservationist employees or people visiting the site to learn about Missouri and the conservation department. Therefore, the people who are

choosing to visit the site and have at least a small interest in topics relevant to naturalistic landscape design. For the Transit Center, the respondents were Transit Center employees who may not necessarily have an interest in or care about topics relevant to naturalistic landscape design. While the preference levels for the two sites were quite different, there were similarities in factors that influenced the preference levels.

### ***Levels of Perceived Safety***

Levels of perceived safety was seen in Chapter Four to be an influence of, and linearly related to preference levels. The overall levels of perceived safety between this study's two sites was quite different and therefore, according to the findings of this study, corresponds to the overall preference levels. The average level of perceived safety for the Discovery Center was high, which corresponds to the high level of overall preference. The low level of overall preference at the Transit Center corresponds to the low level of average perceived safety. Therefore, the difference in the two average levels of safety may be a factor for the overall difference in preference levels of the two study sites.

### ***Education Levels of the Respondents***

Other factors that may influence differences in preference levels between the sites are level of education, participation in extra classes and seminars, and knowledge of native plants and their benefits of the majority of the respondents. The majority of the respondents' educational backgrounds for the two sites were also quite different. Most respondents visiting the Discovery Center had completed a bachelor's degree and many participated in extra classes and seminars on topics relevant to naturalistic landscapes. Most respondents at the Transit Center have only a high school diploma and fewer had participated in extra classes and seminars. The difference in education and knowledge of native plants and their benefits may result in the difference in the overall preference levels between the two sites because higher levels of formal education, extra classes and the knowledge of native plants and their benefits were seen to relate to higher levels of preference.

Therefore, the difference in the average preference levels for the two sites may have been influenced by the aesthetic characteristics of the site, the purposes for attending the site, the level of perceived safety, and the level of education and knowledge of the respondents could also be inferred as being a cause for the difference in the overall preference levels of the two sites.

### ***Similarities Between the Results of this Study and the Results of Previous Studies***

A similarity in this study as compared to previous studies was how perceived safety influenced overall preference levels. The significance of perceived safety in relation to preference levels in this study related to the findings in the study completed by Jorgensen et al. (2002). Anna Jorgensen and her colleagues found that perceived safety was a major determinant of preference levels for naturalistic landscapes. In this study it was determined that safety was an influence on and linearly related to preference levels.

The resulting level of preference in conjunction with the participation in outdoor activities was another similarity in the findings of this study and previous studies. Rachel Kaplan, Stephen Kaplan and Anna Jorgensen explained that people who interact with the natural environment through activities, such as hiking, gain a sense of self-awareness and confidence in themselves (Kaplan and Kaplan 1989; Kaplan and Kaplan 1995, 148; Jorgensen 2008, 304 Dunnett and Hitchmough (eds.)). Based on the benefits of interacting with the natural environment and the resulting increase in familiarity with nature it may be assumed that those respondents that participate in outdoor activities will have a higher average preference level for naturalistic landscapes. The pattern explained by the Kaplans and Anna Jorgensen may also be seen through the results of this study as those respondents who participate in outdoor activities have higher preference levels than respondents who do not participate in outdoor activities.

A third similarity in this study's results compared to previous studies was how age affects the respondents' preference levels. According to Lyons (1983) and Herzog (2000) elderly people and teens have the lowest preference level for naturalistic landscapes. They also explained that adults have lower preference levels than children and higher levels than teens (Dunnett and Hitchmough 2008, 302). The results of this study follow these patterns to some extent. At both sites, it was found that the oldest age range of 51-65 on average had lower preference levels than the younger age ranges. Those respondents falling in the range of 25-50, which are like the adults of previous studies tended to have preference levels higher than the elder age range, which is in line with the previous studies. In this study, the closest age range to teens was respondents from 18-25, but those respondents actually had some of the highest preference levels. According to these patterns, the younger people tended to have higher preferences than those that could be considered in the senior population. After examining the results of this study and how the results

of this study correlate to previous studies some areas were identified that could be changed or expanded for future research.

### **Weaknesses in the Questionnaire and the Study's Design**

The completion of the questionnaires and the analysis of the data collected provided information that was related to the results from previous preference studies. When analyzing the data and relating it to previous studies, weaknesses were identified. Weaknesses were found in both the questionnaire and in the design of the study.

The questionnaires should have also determined the gender of the respondents. Gender could have provided more insight into what influences preference levels. According to previous studies completed by Jorgensen et al. (2002), Valentine (1989), and Madge (1997), gender was a major influence in perceived safety and according to this study, and the study completed by Jorgensen et al. (2002), safety is a significant indicator of preference levels. Therefore, gender could have had a significant influence on preference levels.

Along with the gender of the respondents, additional age breakdowns may have benefited the study and made it more comparable to more of the previous studies such as Lyons (1983) and Herzog's (2000) studies on age. Children, teenagers and more mature respondents may have provided more insight into how age affects preferences. At the Discovery Center a larger age breakdown would be possible because the visitors, seen by the author when administering the survey questionnaires, range in age from babies to those older than sixty-five. At the Transit Center a larger age breakdown may not have provided more insight due to the fact that those visiting the site are employees and are not below the legal working age. The differences seen in the ages of the visitors at the two sites illustrates that choosing two very different sites may be a weakness of the design of the study.

The differences in aesthetic characteristics and level of maintenance at the two study sites may be a weakness in the design of the study. When the sites were chosen, the aesthetic differences were thought to be a positive aspect in the fact that it had the possibility of providing a larger range of preferences. After completing the analysis of the data from the questionnaires, the differences were seen to create major differences in the results. The comparison of one site that was designed well and maintained in a way that shows care, to a site that was designed well, but poorly maintained so that care does not seem to exist may have caused the results to be

skewed. The differences between the two sites illustrated that the inclusion of additional sites may have been beneficial.

The process used for the administration of the two survey questionnaires may be a weakness in the design of the study. At the Discovery Center the administration of the questionnaires consisted of passing out the questionnaires to people that were coming in and out of the building. The presence of the author during the administration process may have led to a less honest response due to the fact that the people wanted to “be nice” and tell the author what they thought the author wanted to hear. At the Transit Center the administration consisted of sending out an e-mail version of the questionnaire. The lack of presence of the author during the administration and a complete feeling of anonymity may have led to responses that were more honest. The respondents at the Transit Center may not have had the feeling of needing to tell the author what they thought the author wanted to hear. Therefore, administering the questionnaires in two different ways may have provided biased results.

Another weakness associated with the administration of the survey questionnaires may have been the time in which the questionnaires were administered. In September, the naturalistic landscape was at a peak in aesthetic interest. If the questionnaires were administered in early Spring or Winter, the aesthetic interest of the sites would have been lower. The lack of aesthetic interest may have resulted in the lower preference levels for the sites. Therefore, the time of year chosen to administer the sites may have caused a bias in the results.

## **Recommendations**

Results from the study highlighted that some people clearly do not prefer naturalistic landscapes in civic spaces. This section provides recommendations, through using results from this study. Recommendations include a checklist for the design of naturalistic landscapes that may aid in increasing the level of preferences for naturalistic landscapes in civic location within the Mid-west Region of the United States and recommendations that pertain to this study.

### ***Checklist for the Design of Naturalistic Landscapes***

As seen in this study through the results and the aesthetic differences in the study’s sites, naturalistic landscapes should be designed in such a way as to create a sense of care and maintenance. A checklist for designers has been developed (see Appendix G). The checklist

contains factors such as plant selection, maintenance, the inclusion of elements for safety and activities, and the inclusion of educational information and signage.

### ***Plant Selection***

The plant selection was determined using the background research and the study's two sites. Plant species should include native grasses, native forbs, native shrubs and native trees. Writings reviewed in Chapter Two, the observations of the study's sites and the results of the survey questionnaires illustrated that the inclusion of colorful flowering forbs leads to higher preference levels. Therefore, the combination of native plant species should include a larger composition of native flowering forbs, such as sunflowers, black-eyed susan, liatris, and aster, than native grasses. Along with providing more color, native forbs provide a greater range of textures. As illustrated in the writings of Chapter Two and the findings of this study, an increase in texture leads to higher preference levels. Native forbs are not the only plant species that add a variety of textures. Native shrubs, such as sumac, add plant species that typically have more varied texture than native grasses.

### ***Maintenance***

The maintenance and inclusion of elements that provide a sense of care were seen, through the writings in Chapter Two and the findings of this study, to greatly effect people's preferences for naturalistic landscapes in civic spaces. Naturalistic landscapes should maintained to look neat along the edges with the use of buffers, as explained by Joan Nassauer (1995). If the buffers are allowed to become overgrown, the space will look like it is not cared for. Buffers not only provide a sense of neatness and care, but they also are used to create perceived safety.

### ***Elements for Perceived Safety***

In this study, perceived safety was seen to strongly affect preference levels. When naturalistic landscapes are close to a building, especially the building's entrance, there should be a buffer area, as explained in Chapter Two under Naturalistic Landscapes, that deters small animals from being close to the people using the space. The buffer also provides a circulation area that allows a person to traverse the area without coming into contact with vegetation. To further provide a space with higher levels of perceived safety there should be clear visual paths so users do not feel that threats could be hiding in corners or behind vegetation. Along with clear

visual paths to deter human and animal threats, there should also be a clear visual of oncoming traffic if the naturalistic landscape is near driving lanes. Overall, the space should be designed in a way that provides buffers to keep small animals in the naturalistic landscape and not in areas where they do not belong. The naturalistic landscape should also not interrupt visual clarity when both walking and driving.

### ***Elements for Activities***

As seen in the results of previous preference studies, reported in Chapter Two, and in the results of this study, the participation in outdoor activities is a significant influence of preference levels. To increase the amount of outdoor activities that take place in designed naturalistic landscape spaces (those larger than parking lot medians or small raingardens) elements could be included that allow for outdoor activities to take place. The activities designed for may be both scheduled and non-scheduled.

Many scheduled activities that do not need a designed landscape element could be catered to all age groups. Activities for adults could include activities that focus on gardening and the benefits of implementing naturalistic landscapes in the people's home landscapes. Other adult activities that do not need a designed landscape element could involve photography and other artistic classes that focus on the beauty of native grasses, forbs, shrubs, trees and the insects and small animals that live in the landscape. Catering to teens and young adults could be accomplished through scheduled activities such as school activities, activities that focus on drawing and other creative endeavors. Activities for children could focus on educating on insects, plants and other species that are found in naturalistic landscapes.

A medium to large designed element for scheduled activities could be a gathering space or a small amphitheater, provided the naturalistic landscape is large enough. The medium to large designed element could be used for scheduled activities such as concerts, lectures and wine and food tastings. The designed elements within naturalistic landscape spaces could also be used for meetings and activities for groups such as girl scouts, boy scouts, youth groups and garden clubs. Along with scheduled activities, the naturalistic landscape could include design elements for non-scheduled activities, which allow the space to be used at any time.

A design element that could be included in naturalistic landscapes for non-scheduled activities is trails for walking and jogging. Providing walking and jogging trails allows the space to be used at anytime by anyone and can increase familiarity with naturalistic landscapes.

Seating and resting areas could also be included along the trails for resting or relaxing during a lunch break. Designing a space that can be used for both scheduled and non-scheduled activities would allow people to become familiar with using the naturalistic landscapes for outdoor activities, and likely would increase their level of preference for those landscapes.

### ***Educational Information and Signage***

According to the results from this study and the results of previous studies knowledge of topics relevant to naturalistic landscapes increase overall preference level. Therefore, increasing people's knowledge through educational programs and signage will likely increase preferences for naturalistic landscapes. Informational signage should catch the people's attention and be memorable. To catch people's attention, signage should be provided that is high in color and contains pictures and illustrations. Information should be provided without using a vast amount of text. The signage should be easy to understand for those who do not want to read a large amount of text and for those that do want to read text. In conjunction with signage, educational pamphlets could be provided for those wanting more information.

Using this checklist of elements when designing naturalistic landscapes in civic spaces in the Mid-west region of the United States may aid in creating a landscape that is more highly preferred, appreciated and maintained.

### ***Recommendations for this Study and Future Studies***

After completing the background research and reviewing the results of the survey questionnaires and the conclusions, recommendations for this study were identified. The recommendations involve the future of this study and the design of future studies.

Overall the results of this study provided valuable information regarding aesthetic preferences and the factors that influence those preferences. Even though the results of this study were valuable, further research and review of people could be even more valuable. Future research could further knowledge and aid in gaining a better idea of the types of people who prefer naturalistic landscapes. Future research could also be used to clear up areas where the results were slightly skewed due to the small sample size and differences in the study's sites.

Future research should be completed on existing writings relevant to naturalistic landscapes along with relevant preference studies that have previously been completed. Future study should use the same basic research design as this study, considering this study provided

some valuable information, but with some changes (see section on Weaknesses). Multiple sites should be chosen for the administration of surveys. The questionnaire should be edited to include a question regarding gender and the question addressing the age of the respondent should be edited to include a larger breakdown of age ranges. Also, the administration of the surveys would need to be completed in the same way for all sites to limit the amount of bias that may occur.

Another aspect of the study that could be completed in the future would be to complete more than one administration process at multiple times of the year. Completing more than one administration would increase the sample size and would provide more insight into preference levels. A greater insight would be gained due to the survey of respondents when the sites are at their aesthetic peak and when the sites are not at their aesthetic peak, which would provide a better view of the users preferences for naturalistic landscapes.

### **Summary**

This study has been instrumental in furthering my knowledge on the subject of naturalistic landscapes and the characteristics needed to make them more highly preferred. Through completing the study I not only gained knowledge but experiences. Experiences gained were in the areas of writing, researching, and developing and administering questionnaires.

For the practice of landscape architecture or practices related to the design of naturalistic landscapes, this study is a starting point to understanding aesthetic preferences levels and how they relate to naturalistic landscapes. The study also provides information on characteristics needed to design naturalistic landscape spaces that have moderate to high preference levels.

Overall, the study is the beginning of a line of inquiry into creating sustainable, naturalistic landscapes in civic spaces. It provides valuable information that can be used as model for future studies on aesthetic preferences in relation to naturalistic landscapes.

## References

### Books

- Bang, C., J. Braute and B. Kohen. *Naturleikplassen. Einstad for Leikog Laering*. Oslo: Universitetsforlaget, 1898.
- Bourassa, S. *The Aesthetic of Landscape*. London: Belhaven Press, 1991.
- Clayton, V.T. Wild gardening and the popular American magazine, 1890-1918. In Wolschke-Bulman, J. (ed.) *Nature and Ideology: Natural Garden Design of the Twentieth Century*. Washington D.C.: Dumbarton Oaks, 1997.
- Dunnett, N., and James Hitchmough, ed. *The Dynamic Landscape*. New York: Taylor & Francis, 2008.
- Dunnett, N. The dynamic nature of plant communities – pattern and process in designed plant communities. In Dunnett, N. and J. Hitchmough (eds.). *The Dynamic Landscape*. New York: Taylor & Francis, 2008.
- Eckbo, G. *Landscape For Living*. Los Angeles: Architectural Records, 1950.
- Grese, R. The prairie gardens of O.G. Simonds and Jens Jensen. In O'Malley, T. and M. Treib (eds.). *Regional Garden Design in the United States*. Washington D.C.: Dumbarton Oaks 1995.
- Hartig, T.A. Testing restorative environments theory. Unpublished doctoral dissertation. Irvine: University of California, 1993.
- Hitchmough, J. Naturalistic herbaceous vegetation for urban landscapes. In Dunnett, N. and J. Hitchmough (eds.). *The Dynamic Landscape*. New York: Taylor & Francis, 2008.
- Hubbard, H.V. and T. Kimball. *An Introduction to the Study of Landscape Design*. New York: Macmillan, 1917.
- Johnson, L. and C. Lees. *Wildflowers across America*. New York: National Wildflower Research Area, 1988.
- Jorgensen, A. The social and cultural context of ecological plantings. In Dunnett, N. and J. Hitchmough (eds.). *The Dynamic Landscape*. New York: Taylor & Francis, 2008.
- Kaplan, R. and S. Kaplan. *Cognition and environment: Functioning in an uncertain world*. New York: Praeger, 1982.
- Kaplan, R. and S. Kaplan. *The Experience of Nature*. Ann Arbor: Ulrich's Bookstore, 1995.

- Kaplan, R., S. Kaplan, and R. L. Ryan. *With People in Mind*. Washington: Island Press, 1998.
- Karson, R. Warren H. Manning: pragmatist in the wild garden. In Wolschke-Bulmahn, J. (ed.). *Nature and Ideology: Natural Garden Design of the Twentieth Century*. Washington D.C.: Dumbarton Oaks, 1997.
- Kaplan, S. The role of location processing in the perception of the environment. In Archea, J. and C. Eastman (eds.). *Edra Two*. Stroudsburg, PA: Dowden, Hutchinson, and Ross.
- Kingsbury, N. Contemporary overview of naturalistic planting design. In Dunnett, N. and J. Hitchmough (eds.). *The Dynamic Landscape*. New York: Taylor & Francis, 2008.
- Lynch, K. *The Image of the City*. Boston: MIT Press, 1960.
- McHarg, I.L. *Design with Nature*. Philadelphia: Falcon Press, 1969.
- Morrison, D. A methodology for ecological landscape and planting design – site planning and spatial design. In Dunnett, N. and J. Hitchmough (eds.). *The Dynamic Landscape*. New York: Taylor & Francis, 2008.
- Nasar, J. L. *Environmental Aesthetics: Theory, Research, & Applications*. New York: Cambridge University Press, 1992.
- Robinson, F. B. *Planting Design*. New York: Whittlesey, 1940.
- Woodward, J. W. *Signature Based Landscape Design*. New York: John Wiley, 1997.
- Woudstra, J. The changing nature of ecology: a history of ecological planting (1800-1980). In Dunnett, N. and J. Hitchmough (eds.). *The Dynamic Landscape*. New York: Taylor & Francis, 2008.

### **Journals and Papers**

- Bardwell, L.V. 1985. Nature around the corner: Preference and use of nearby natural areas in the urban setting. *Unpublished master's thesis*. University of Michigan, Ann Arbor.
- Buhyoff, G. J., J. D. Welman, H. Harvey and R.A. Fraser. 1978. Landscape architect's interpretations of people's landscape preferences. *Journal of Environmental Management* 6: 25-262.
- Buttel, F. H. and W. L. Flinn. 1978. Social class and mass environmental beliefs, a reconstruction. *Environment and Behavior* 10-3: 433-450.
- Clark, R.N. and G.H. Stankey, 1979. The recreation opportunity spectrum: a framework for planning, management and research. *USDA Forest Service General Technical Report PNW-98*.

- Fjortoft, I. and J. Sageie. 2000. The natural environment as a playground for children, Landscape description and analysis of a natural playscape. *Landscape and Urban Planning* 48: 83-97.
- Grahn, P. 1991. Om Parkers Betydelse. Dissertation. Department of Landscape Planning, SLU & Movium: *Stad and Land* 93.
- Han, Ke-Tsung. 2007. Responses to Six Major Terrestrial Biomes in terms of Scenic Beauty, Preference, and Restorativeness. *Environment and Behavior* 39: 529-556.
- Herzog, T. R., E. J. Herbert, R. Kaplan and C. L. Crooks. 2000. Cultural and Developmental comparisons of landscape perceptions and preferences. *Environment and Behavior* 33(3):323-346.
- Jorgensen, A., J. Hitchmough and T. Calvert. 2002. Woodland spaces and edges: their impact on perception of safety and preference. *Landscape and Urban Planning* 59: 1-11.
- Kaplan, R. 1985. Nature at the doorstep: residential satisfaction and the nearby environment. *Journal of Architectural and Planning Research* 2: 115-127.
- Kaplan, R. 1985. The analysis and perception via preference: A strategy for studying how the environment is experienced. *Landscape Planning* 12: 161-176.
- Kaplan, S. 1987. Aesthetics, affect, and cognition: Environmental preference from an evolutionary perspective. *Environment and Behavior* 19: 3-32.
- Knops, J. M. H. et al. 1999. Effects of plant species richness on invasion dynamics, disease outbreaks, insect abundance and diversity. *Journal of Ecology* 49: 25-269.
- Lyons, E. 1983. Demographic correlates of landscape preference. *Environment and Behavior* 15: 487-511
- Madge, C. 1997. Public parks and the geography of fear. *Economic Social Geography* 88(3): 237-250.
- McCann, K.S. 2000. The diversity and stability of ecosystems. *Nature* 405: 228-233.
- McHarg, I.L. 1966-67. An ecological method for landscape architecture. *Landscape Architecture* 57:105-107.
- Moore, E.O. 1981. A prison environment's effect on health care service demands. *Journal of Environmental Systems* 11: 17-34.
- Nassauer, J. I. 1995. Messy Ecosystems, Orderly Frames. *Landscape Journal* 12(2): 161-170.

- Parsons, R. 1995. Conflict between ecological sustainability and environmental aesthetics: conundrum, canard or curiosity. *Landscape and Urban Planning*. 32: 227-244
- Talbot, J.F. and R. Kaplan. 1984. Needs and fears: The response to trees and nature in the inner city. *Journal of Arboriculture* 10: 222-228.
- Ulrich, R.S. 1984. View through a window may influence recovery from surgery. *Science* 224: 420-421
- Valentine, G. 1989. The geography of women's fear. *Area* 21(4):385-390.
- Van der Hoven, G. 1977. Naturalistic landscaping. *Kansas State University Agricultural Experiment Station and Cooperative Extension Service*. Kansas State University.
- Verderber, S. 1986. Dimensions of person – window transactions in the hospital environment. *Environment and Behavior* 18: 450-466.
- West, M.J. 1986. Landscape views and stress responses in the prison environment. *Unpublished master's thesis*. University of Washington, Seattle.
- Zube, E.H. 1984. Themes in landscape assessment theory. *Landscape Journal* 3: 104-110.

### **Internet Sources**

- Johnson County Transportation Council. The JO. <http://www.thejo.com/about.shtml#facility>
- Johnson County, Kansas, Government. Johnson County Stormwater Management Program. Infiltration Study at Johnson County Transit Center in Cooperation with KSU. <http://stormwater.jocogov.org/Projects/CurrentProjectDocs/TransitCenterInfiltration/transitcenter.shtml>
- Missouri Department of Conservation. Discovery Center. Anita B. Gorman Conservation Discovery Center Urban Campus. <http://mdc.mo.gov/regions/kansas-city/discovery-center>

### **Other Sources**

- Robert Fluchel, e-mail to author, September 17, 2010.

## **Appendix A - Naturalistic Landscape Design's Origins**

The information contained in this Appendix was used to further the knowledge of how Naturalistic Landscape began and changed through out the years. Even though it was relevant to the author, it is not completely needed for the readers' understanding of the study.

The design movements, styles and influential designers from the past have inspired the naturalistic landscape design seen today. Some movements and styles influential to naturalistic landscape design were the picturesque, the gardenesque, the garden city, the modern movement, the municipal engineer, the ecological and the community involvement style. Alexander von Humbolt, Ossian Cole Simonds, Jens Jensen, Warren H. Manning, Dr. Edith Roberts, Elsa Rehmann, John Curtis, Henry Greene, Aldo Leopold, Florence Bell Robinson and Lady Bird Johnson represent designers and conservationists from the past that were influential in the development of naturalistic design throughout the years (Dunnett and Hitchmough (eds.), 2008).

There are two main applications of ecological ideas that have been traced to the last 200 years, the plant geographic approach and the physiognomic approach. These planting styles arose out of the Enlightenment, which was a movement that encouraged a different perception of nature. The plant geographic approach's aim was to recreate representative examples of specific vegetation types, or their character, from around the world. Alexander von Humbolt represents this approach and assessed nature using a scientific method through inspired analysis. His actions encouraged a new understanding of the world's vegetation and inspired a new practice of planting parks and gardens that related to their arrangements in nature. The plant geographic approach continued to become more sophisticated and refined as people's knowledge of plants advanced. The approach was considered the best and most instructive way to exhibit plants, especially in botanical gardens (Woudstra, 2008 in Dunnett and Hitchmough (eds.)).

The physiognomic approach focused on the natural character, pattern and functioning of vegetation, but without regard to the geographic origin of the component species. Scientific researchers developed this approach to educate the general public and to test ecological theory. Many of the people not involved in the movement saw the approach as an economic and more sustainable planting scheme instead of just a way to test theories and educate the public. In 1835, Loudon promoted the idea of "scientific gardens" in his essay "On the laying out of public gardens and promenades". He developed the idea that the scientific garden would be composed

of twelve categories, which included zoological, botanical, horticultural and agricultural gardens, arboretums, herbacetums, plantariums, gardens of British plants, local floras, geographical gardens and geological gardens (Woudstra, 2008 in Dunnett and Hitchmough (eds.)).

In the nineteenth-century, American landscape gardener Andrew Jackson Downing was conscious of Alexander von Humbolt's plant geographic approach, but he did not apply Humbolt's design approaches in his landscape designs, nor did he discuss them in *The Theory and Practice of Landscape Gardening* in 1859. Humbolt's approaches were not seen in the United States until Frank A Waugh, a follower of Humbolt, returned to the United States. Waugh studied at the Royal Horticultural College in Berlin-Dahlem with Willy Lange and was inspired by the latter's theories, which he made popular as a Professor at the Massachusetts State Agricultural College and adapted to an American context in such publications as *The Natural Style in Landscape Gardening* in 1917 (Wolschke-Bulmahn, 1997; Woudstra, 2008 in Dunnett and Hitchmough (eds.)).

In the mid to late 1800s, in the United States, there was a concern about the destruction of the wild flora and fauna driven by advances in technology and the fundamental way in which people lived. The massive industrial expansion in the second half of the nineteenth-century created great amounts of wealth by 1900. The country's morality was being eroded due to consumption and uncontrolled materialism. Also around 1900, the heavy amount of immigration escalated the number of poor, the under educated and a more culturally diverse population. The influx threatened the country's identity and values. Before the industrial expansion and the influx of immigration of the late nineteenth-century, the interaction with nature was a positive influence and solidified physical, moral and spiritual well-being. The natural environment was considered such a positive influence, that a "return to nature" was accepted by the general public, as a way to fix the social unrest and upheaval that was seen throughout the country. The "return to nature" was illustrated by the call for the conservation of wild flowers and gardens that flourished as popular topics from the 1890s until the end of the First World War (Clayton, 1997; Woudstra 2008, 42 in Dunnett and Hitchmough (eds.)).

To counteract the decline in the country's identity, caused by the influx in immigration of the late nineteenth-century, American landscape architects and gardeners worked to create a distinctive American style. Ossian Cole Simonds and Jens Jensen both experimented with the use of native species and developed a garden style that could be referred to in 1915, as the prairie

style. Wilhelm Miller coined the name in a publication entitled *The Prairie Spirit of Landscape Gardening* (1915). The publication featured the work of Simonds and Jensen. The prairie style was defined as “an American mode of design based upon the practical needs of the Middle-Western people and characterized by preservation of typical Western scenery, by restoration of local color, and by repetition of the horizontal line of land and sky, which is the strongest feature of prairie scenery” (Woudstra, 2008 in Dunnett and Hitchmough (eds.)).

Jens Jensen was possibly the most widely recognized practitioner of the prairie style approach. Jensen was born in Denmark in 1861, and immigrated to the United States when he was in his twenties. Jensen practiced primarily in the Midwest from 1890 until his death in 1951. Jensen was well known for his work in the Chicago park system and in a wide range of other private and public commissions. He was known for his use of masterful spatial designs and for his increasing reliance on the Mid-western prairies, savannahs and forests as models for those designs. Jensen did not propose restoration of prairie landscapes, but as they considered their gardens to be art, intended to provide images of the prairie to be idealized. In his later works, Jensen focused on the sole use of native plants grouped into ecological associations that were found in nature, one such design was the Lincoln Memorial in Springfield, Illinois. He anticipated natural succession and used his design as a framework for a montage that would develop as succession took its course (Grese, 1995; Dunnett and Hitchmough, 2008; Woudstra, 2008 in Dunnett and Hitchmough (eds.)).

Warren H. Manning of Boston, around 1910, favored a more pragmatic approach to landscape design. Manning first used nature gardens, or wild gardens, where the existing conditions were carefully surveyed. He then eliminated material that was out of place or did not functionally fit into the space. Plants were placed in the location where they appeared to grow naturally. His approach needed a solid understanding of the site conditions and plants, and demanded a clear knowledge of nature. Manning recommended the use of native plants due to the ease of availability, transplanting, growing and low cost, but he was not strict about the use of native plants and recommended cultivated species that could add floral value. He stated, “the spirit of the wild gardens is essentially composition.” From the 1920s forward, ecological principles were applied by other landscape architects and designers (Karson, 1997; Woudstra, 2008, 43-44 Dunnett and Hitchmough (eds.)).

In 1929, Dr. Edith Roberts and Elsa Rehmman co-authored *American Plants for American Gardens*. The book explained that some of the eastern United States' plant communities could be used as a basis for designing gardens and landscapes with a sense of place, while still being ecologically sensitive (Morrison, 2008 Dunnett and Hitchmough (eds.)).

The great depression in the 1930s and subsequent Second World War, lead to a decline in the popularity of naturalistic landscape design. In 1934, John Curtis and Henry Greene undertook a more exacting approach through experimenting with re-establishing prairie plant communities at the University of Wisconsin, Madison. Their concern and subsequent experimentation was fueled by the disappearance of the prairie and by the despoliation of the land. Aldo Leopold, who joined the university in 1933, as a Professor of Wildlife Management, started the cause. Leopold became the spiritual leader of the restoration ecology movement, which used ecological restoration as a technique for research (Jordan et al. 1987, 3). Leopold's writings and theories have been the spark for many generations of environmentalists to embark upon ecological restoration projects while bypassing the landscape architecture profession (Woudstra, 2008 in Dunnett and Hitchmough (eds.)).

Landscape Architect, Florence Bell Robinson, worked for the University of Illinois and in 1940, wrote *Planting Design*. The book included an extended selection on ecological factors, which included soil, climate and a list of natural plant associations. The overall principle she quoted was "the survival of the fittest," which was determined through ecological factors such as competition and succession (Robinson 1940, 105-121; Woudstra 2008, 44 in Dunnett and Hitchmough (eds.)).

Garret Eckbo determined that ecology referred to the conditions plants required for healthy growth. He did not personally involve himself with ecology and the natural associations of plants. To deal with the ecological aspect of the design, he recommended that an ecologist be used as a consultant throughout the design process (Eckbo 1950, 94, 105; Woudstra 2008, 44 Dunnett and Hitchmough (eds.)).

In 1967, Ian McHarg proposed "An ecological method for landscape architecture." In it, he suggested that, "ecology provided the single indispensable basis for landscape architecture and regional planning." McHarg's interests were in the overall system and he did not comment on issues of detail such as planting design (McHarg 1966, 67; Woudstra, 2008 in Dunnett and Hitchmough (eds.)).

While McHarg was developing his ecological methods in the 1960s, Lady Bird Johnson, wife of President Lyndon Johnson, was working to popularize wild flowers. She worked with a group of volunteers to form the Committee for a More Beautiful Capital in 1965. The beautification involved an approach that was more than just aesthetic. It included a concern for the physical and human quality, and for clean water, air, roadsides and safe waste-disposal. It also involved the preservation of landmarks, parks and wilderness areas. The approach to the beautification and betterment of the natural environment was created so that areas could be passed on to future generations in good condition. Along with her new approach, in 1982, Lady Bird donated 60 acres of ground and the money needed to found the National Wildflower Research Center. The focus of the Center was to learn as much as possible about the growth and propagation of wildflowers and to spread that knowledge among developers, park managers and private citizen across the United States (Johnson and Lees 1988, 8-19). The emphasis in her work was to establish regional wildflower meadows that complimented the woodland gardens in the East and prairies in the Midwest (Woudstra, 2008 in Dunnett and Hitchmough (eds.)).

Even with the work of Eckbo, McHarg and Lady Bird Johnson, it was not until the 1970s that naturalistic landscape design started to reemerge as a popular design process. The first Earth Day celebration, in 1970, sparked resurgence in the use of native plant communities as the basis for design, and became a popular undercurrent in American landscape architecture. The undercurrent was fueled by what was termed “natural landscape restoration concepts,” and used the works of Jensen, Rehman and Roberts as its main references (Woudstra 2008, 46 in Dunnett and Hitchmough (eds.), Morrison 2008, 116 in Dunnett and Hitchmough (eds.)).

Today, the emphasis in naturalistic landscape design is focused on artistic outcomes, which is especially true when the principles are applied to garden plantings in the public realm. Artistic and aesthetic outcomes are always a factor, but in the past they were more focused on challenging the perceived notions of what garden plantings are supposed to look like (Woudstra 2008, 54 Dunnett and Hitchmough (eds.)).

Darrell Morrison, Professor of the School of Environmental Design at the University of Georgia, believes that local character should be reflected in the design as to celebrate regional diversity. Morrison stressed, using the work of Jensen, that native plant communities should be used in a way that created meaning for the people. As an example, he used the flow and movement of water as a theme for the overall spatial composition of a design. Creating a theme

that the viewer could understand, allowed them to place themselves meaningfully into the space. Morrison not only cares about the people and how they react to the space, but he also cares about how wildlife interacts with and within the space (Kingsbury, 2008 in Dunnett and Hitchmough (eds.)).

Morrison believes that layering, or the vertical distribution of plants, produces plantings that are not only visually rich, but can support a variety of wildlife through the creation of diverse habitats. Prairie restorationist, Ron Bowen also pushes for large amounts of diversity, but unlike seeing it solely for habitat, he believes that rich diversity is positively related to the sites stability (Bowen, 2001; Kingsbury, 2008 in Dunnett and Hitchmough (eds.)).

## **Appendix B - Mental Maps**

Mental maps are related to events, activities, people, important issues, and even trivial happenings. Mental maps are the way in which knowledge is stored in a person's brain. People have maps for almost everything they know. Every person creates his or her own sets of mental maps, which create a challenge for the exchange of information (Kaplan, Kaplan and Ryan 1998, 23).

Each person's mental maps are unique to their individual experiences. There is only a limited knowledge of how our experiences and stored knowledge, as maps, are related to other people's maps. The knowledge of the limitations makes it easier to understand and appreciate the challenge of successful information transfer. There are processes that can be undertaken to help ensure successful transfer given the inherent difficulties. The processes focus on the targeted recipient of information transfer, rather than the knowledge of the information provider. The processes include relating the information to what the individual already knows and the quantity and quality of the information (Kaplan, Kaplan and Ryan 1998, 24).

When relating the information to what the individual already knows, there are considerations that must be understood. People often resent being told information that they already know, but the information provided should be connected to what they know. Through connecting provided information to existing mental maps, the provider can more successfully ensure the person will remember the given information. People appreciate information that they can remember and use to expand their previous knowledge. If too much information is provided, the person receiving the information is more likely to forget it. Providing too much information is a common error. The flow of information is another factor that impacts information retention and the creation of new mental maps. The use of visual and spatial information in combination with words is more effective than solely using words when providing information that may be retained. Another factor that greatly influences information storage and in turn preference, is the differences in people's backgrounds and coinciding mental maps (Kaplan, Kaplan and Ryan 1998, 24-25).

# Appendix C - Discovery Center Questionnaire

## Landscape Preference Survey Questionnaire

Survey No. -

### The Aesthetics of Naturalistic Landscapes in Civic Spaces

Amanda Ulrich

Kansas State University

June 2009

Your participation in this survey is entirely voluntary and should present no appreciable risk to you. You may choose not to answer any of the questions presented in the survey. Names, addresses, and genders will not be recorded; therefore, all information is anonymous. The results of this survey will be presented in their entirety as part of my Master's thesis. If you have questions regarding your rights as a subject or the manner in which this research is being conducted, you may contact the study's Principal Investigator:

Dr. Timothy D. Keane, Professor, Landscape Architecture / Regional & Community Planning  
216 Seaton Hall, Kansas State University, Manhattan, KS 66506  
Phone: 785.532.2439 Email: whisker@ksu.edu

Please answer the questions to the best of your ability – questions are on both sides of the pages.  
Space has also been provided for additional comments.

### Part 1 - Parking Lot Landscape

1. Rate your level of preference for the Discovery Center's parking lot landscape below (circle the best answer).

(5 being strongly like, 3 being neutral, and 1 being strongly dislike)

1      2      3      4      5

2. To more fully understand your level of preference for the parking lot landscape, please rate each category below (circle the best answer).

(5 being a strong level of the category, 3 being a neutral level, and 1 being a low level of the category)

Beauty      1      2      3      4      5

Naturalness      1      2      3      4      5

Order      1      2      3      4      5

Color      1      2      3      4      5

3. Rate the level of safety you feel in the landscape and describe why you feel this way (circle the best answer).

(5 being a feeling of safety, 3 being a neutral level, and 1 being a feeling of danger)

1      2      3      4      5

Reasoning: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### **Part 2 - Prairie Landscape**

4. Rate your level of preference for the Discovery Center's prairie landscape below (circle the best answer).

(5 being strongly like, 3 being neutral, and 1 being strongly dislike)

1      2      3      4      5

5. To more fully understand your level of preference for the prairie landscape, please rate each category below (circle the best answer).

(5 being a strong level of the category, 3 being a neutral level, and 1 being a low level of the category)

Beauty	1	2	3	4	5
Naturalness	1	2	3	4	5
Order	1	2	3	4	5
Color	1	2	3	4	5

6. Rate the level of safety you feel in the landscape and describe why you feel this way (circle the best answer).

(5 being a feeling of safety, 3 being a neutral level, and 1 being a feeling of danger)

1      2      3      4      5

Reasoning: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### **Part 3 - Overall Landscape**

7. How often do you visit the discovery center (check the answer that best applies)?

\_\_\_ Weekly    \_\_\_ Monthly    \_\_\_ Bimonthly    \_\_\_ Twice a Year    \_\_\_ Yearly

8. What is your favorite time of the year to view the Parking lot and Prairie landscapes (check the answer that best applies)?

Spring       Summer       Fall       Winter

9. If this is the first time you have visited the landscape, would you return to see the landscape as it progresses through the season?       Yes       No

#### **Part 4 – Natural Landscape Questions**

10. What are native plants?

11. What are some of the benefits of native landscapes (the use of native plants in a natural way)?

**Part 5 - Background Information**

12. Into which age range do you fit (check the answer that best applies)?

18-24       25-35       36-50       51-65

13. Please enter your grade level, or the highest degree you have achieved. If higher than high school, please include your area(s) of focus \_\_\_\_\_

\_\_\_\_\_

14. Have you been involved in any classes, seminars, conferences, etc. that focus on ecology, sustainability, or environmental sensitivity?  Yes  No

If yes, briefly explain the content \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

15. What is your occupation? \_\_\_\_\_

\_\_\_\_\_

16. In what place type do you currently live (check the best answer below)?

Rural       Suburban       Metro/Urban

17. In what City/Town do you currently reside and what is the approximate population? \_\_\_\_\_

\_\_\_\_\_

18. In what place type did you grow up, if different from your current place type (check the best answer below)?

Rural       Suburban       Metro/Urban

19. In what City/Town did you grow up and what is the approximate population, if different from where you currently reside? \_\_\_\_\_

\_\_\_\_\_

20. What residence type do you live in (check the best answer)?

Single family       Multi family (townhouse, duplex)       Apartment

21. Do you own your place of residence?     \_\_\_Yes     \_\_\_No

22. What landscape characteristics best identify the landscape at your place of residence?

(check all characteristics that apply)

- \_\_\_Turf (mowed lawn)
- \_\_\_Native Grasses
- \_\_\_Groups of Perennials
- \_\_\_Annual Beds
- \_\_\_Native Forbes (ex. Echinacea or purple coneflower, Black Eyed Susan)
- \_\_\_Native Shrubs (ex. Ninebark, Serviceberry,
- \_\_\_Ornamental Shrubs (ex. Spirea, Boxwood, Barberry, Crapemyrtle)
- \_\_\_Native Trees (ex. Oak, Maple)
- \_\_\_Ornamental Trees (ex. Crabapple, Flowering Cherry trees, Ginkgo)

23. What do you find to be the most important aspect of the landscape/garden at your place of residence?

(check the characteristic that best applies)

- \_\_\_Low maintenance
- \_\_\_Low water requirements
- \_\_\_Neat and tidy appearance
- \_\_\_Well manicured lawn
- \_\_\_Sustainable use of native plants

24. What comes to mind when you hear the phrase "sustainability"? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

25. Do you recycle on a regular basis?     \_\_\_Yes     \_\_\_No

26. Do you buy recycled products?     \_\_\_Yes     \_\_\_No

27. Do you purchase locally grown products (ex. Shop at a Farmer's Market)?     \_\_\_Yes     \_\_\_No

28. Do you purchase organic products?     \_\_\_Yes     \_\_\_No

29. Do you participate in outdoor activities such as hiking, camping, running, bird watching, hunting, or any others? If yes, please list the 2 that are the most important to you.

---

---

# Appendix D - Johnson County Transit Center Questionnaire

## Landscape Preference Survey Questionnaire

Survey No. -

### The Aesthetics of Naturalistic Landscapes in Civic Spaces

Amanda Ulrich

Kansas State University

June 2009

Your participation in this survey is entirely voluntary and should present no appreciable risk to you. You may choose not to answer any of the questions presented in the survey. Names, addresses, and genders will not be recorded; therefore, all information is anonymous. The results of this survey will be presented in their entirety as part of my Master's thesis. If you have questions regarding your rights as a subject or the manner in which this research is being conducted, you may contact the study's Principal Investigator:

Dr. Timothy D. Keane, Professor, Landscape Architecture / Regional & Community Planning  
216 Seaton Hall, Kansas State University, Manhattan, KS 66506  
Phone: 785.532.2439 Email: whisker@ksu.edu

Please answer the questions to the best of your ability – questions are on both sides of the pages.  
Space has also been provided for additional comments.

### Part 1 - Prairie Landscape

1. Rate your level of preference for the Transit Center's prairie landscape below (circle the best answer).

(5 being strongly like, 3 being neutral, and 1 being strongly dislike)

1      2      3      4      5

2. To more fully understand your level of preference for the prairie landscape, please rate each category below (circle the best answer and provide additional comments you feel pertinent).

(5 being a strong level of the category, 3 being a neutral level, and 1 being a low level of the category)

Beauty      1      2      3      4      5

Naturalness      1      2      3      4      5

Order      1      2      3      4      5

Color      1      2      3      4      5

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. Rate the level of safety you feel in the landscape and describe why you feel this way (circle the best answer).

(5 being a strong level of the category, 3 being a neutral level, and 1 being a low level of the category)

1      2      3      4      5

Reasoning: \_\_\_\_\_  
\_\_\_\_\_

4. How often do you use the transit center (check the answer that best applies)?

Daily       Weekly       Monthly

5. What is your favorite time of the year to view the native landscape (check the answer that best applies)?

Spring       Summer       Fall       Winter

6. If you could make any changes to the native landscape, what would those changes be? Please also provide a short explanation of the reason behind those changes. \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(More space provided on next page)

## **Part 2 – Natural Landscape Questions**

7. What are native plants?

8. What are some of the benefits of native landscapes (the use of native plants in a natural way)?

**Part 3 - Background Information**

9. Into which age range do you fit (check the answer that best applies)?

18-24       25-35       36-50       51-65

10. Please enter your grade level, or the highest degree you have achieved. If higher than high school, please include your area(s) of focus \_\_\_\_\_

\_\_\_\_\_

11. Have you been involved in any classes, seminars, conferences, etc. that focus on ecology, sustainability, or environmental sensitivity?  Yes  No

If yes, briefly explain the content \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

12. What is your occupation? \_\_\_\_\_

13. In what place type do you currently live (check the best answer below)?

Rural       Suburban       Metro/Urban

14. In what City/Town do you currently reside and what is the approximate population? \_\_\_\_\_

\_\_\_\_\_

15. In what place type did you grow up, if different from your current place type (check the best answer below)?

Rural       Suburban       Metro/Urban

16. In what City/Town did you grow up and what is the approximate population, if different from where you currently reside? \_\_\_\_\_

\_\_\_\_\_

17. What residence type do you live in (check the best answer)?

Single family       Multi family (townhouse, duplex)       Apartment

18. Do you own your place of residence?  Yes  No

19. What landscape characteristics best identify the landscape at your place of residence?

(check all characteristics that apply)

- Turf (mowed lawn)
- Native Grasses
- Groups of Perennials
- Annual Beds
- Native Forbs (ex. Echinacea or purple coneflower)
- Native Shrubs (ex. Ninebark, Serviceberry)
- Ornamental Shrubs (ex. Spirea, Boxwood, Barberry)
- Native Trees (Silver Maple, White Oak, Cottonwood)
- Ornamental Trees (ex. Crabapple, Flowering Cherry trees, Ginkgo)

20. What do you find to be the most important aspect of the landscape/garden at your place of residence?

(check the characteristic that best applies)

- Low maintenance
- Low water requirements
- Neat and tidy appearance
- Well manicured lawn
- Sustainable use of native plants

21. What comes to mind when you hear the phrase "sustainability"? \_\_\_\_\_

---

---

22. Do you recycle on a regular basis?  Yes  No

23. Do you buy recycled products?  Yes  No

24. Do you purchase locally grown products (ex. Shop at a Farmer's Market)?  Yes  No

25. Do you purchase organic products?  Yes  No

26. Do you participate in outdoor activities such as hiking, camping, running, bird watching, hunting, or any others? If yes, please list the 2 that are the most important to you.

---

---

27. Please feel free to add any additional comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Thank you for our time. The results of this survey will be combined with others like it and presented in my Master's thesis. If you have any questions, feel free to contact the study's Principal Investigator:

Dr. Timothy D. Keane, Professor, Landscape Architecture / Regional & Community Planning  
216 Seaton Hall, Kansas State University, Manhattan, KS 66506  
Phone: 785.532.2439 Email: whisker@ksu.edu

# Appendix E - Results from the Anita B. Gorman Discovery Center Questionnaire

## Quantitative Analysis

	<b>Averages and Modes</b>		
Parking Lot	avg. preference	4.344	
	avg. beauty	3.906	
	avg. natural	4.469	
	avg. order	3.469	
	avg. color	4.000	
	avg. level of safety	3.813	
Prairie	avg. preference	4.406	
	avg. beauty	4.125	
	avg. natural	4.406	
	avg. order	3.719	
	avg. color	4.000	
	avg. level of safety	3.906	
	frequency of visits	5.000	yearly
	fav. time of year	3.000	fall
	will you return	1.000	yes
	what are native plants (do they know)	1.000	yes
	What are benefits of native plants (do they know)	1.000	yes benefits range from people's social benefits to environmental benefits
age info	mode age range	4.000	51-65
	% of 1 (2)	0.063	18-24
	% of 2 (1)	0.031	25-35
	% of 3 (11)	0.344	36-50
	% of 4 (18)	0.563	51-65
education info	mode education level	3.000	a bachelor's degree
	% of 1 (3)	0.094	high school
	% of 2 (5)	0.156	assoc. or some college
	% of 3 (15)	0.469	bachelor's
	% of 4 (9)	0.281	Master's or PhD

	mode - yes or no to extra classes or seminars	0.000	no extra classes
	# of yes	13.000	
live	mode - place type	2.000	suburban
	% rural (1)	0.219	
	% suburban (16)	0.469	
	% metro (15)	0.313	
grow up	mode - place type	2.000	suburban
	% rural (7)	0.219	
	% suburban (15)	0.469	
	% metro (10)	0.313	
	mode - residence type	1.000	single family
	own yes or no	1.000	yes
at place of residence	turf (yes)	1.000	# of yes 30
	native grasses (no)	0.000	# of no 22
	perennials (yes)	1.000	# of yes 20
	annual beds (no)	0.000	# of no 20
	native forbs (no)	0.000	# of no 22
	native shrubs (no)	0.000	# of no 24
	ornamental shrubs (no)	0.000	# of no 20
	native trees (yes)	1.000	# of yes 20
	ornamental trees (no)	0.000	# of no 19
most important aspect	low maintenance	1.000	# of yes 19
	low water needs	0.000	# of no 20
	neat and tidy	0.000	# of no 20
	lawn	0.000	# of no 20
	sustainable	0.000	# of no 21
	Sustainability what is it (do they know)	0.000	no
	recycle	1.000	yes
	buy recycled products	1.000	yes
	purchase local	1.000	yes
	purchase organic	1.000	yes
	outdoor activities	1.000	yes

## Correlations to Preference

	<b>Parking Lot</b>			<b>Prairie</b>	
	Education to Preference	0.069		Education to Preference	-0.053
	Native plant knowledge to preference	0.214		Native plant knowledge to preference	-0.015
	5 point scale of knowledge	0.247		5 point scale of knowledge	-0.036
	Benefits knowledge to Preference	0.148		Benefits knowledge to Preference	-0.069
	5 point scale benefits	0.365		5 point scale benefits	0.140
	Level of safety to Preference	0.636		Level of safety to Preference	0.345
	Age to Preference	0.068		Age to Preference	-0.159
	Extra classes to preference	0.189		Extra classes to preference	0.220
	Place type live to Preference	0.078		Place type live to Preference	-0.049
	reversed #s	-0.078		reversed #s	0.049
	Place type grow up to Preference	0.151		Place type grow up to Preference	0.043
	reversed #s	-0.151		reversed #s	-0.043
	Sustainability knowledge to preference	0.013		Sustainability knowledge to preference	0.097
	5 point scale knowledge	0.013		5 point scale knowledge	0.097
important aspects	Low Maintenance to Preference	-0.264		Low Maintenance to Preference	-0.058
	Low water needs to Preference	-0.193		Low water needs to Preference	-0.005
	Neat and Tidy to Preference	0.045		Neat and Tidy to Preference	0.166
	Lawn to Preference	0.045		Lawn to Preference	-0.091
	Sustainable to Preference	0.326		Sustainable to Preference	0.296

landscape at residence	Turf to Preference	0.104		Turf to preference	-0.031
	Native Grasses	0.203		Native Grasses	0.166
	Perennials	0.009		Perennials	0.236
	annual beds	0.294		annual beds	0.339
	native forbs	0.361		native forbs	0.338
	native shrubs	0.191		native shrubs	0.253
	ornamental shrubs	0.066		ornamental shrubs	0.093
	native trees	-0.066		native trees	0.319
	ornamental trees	-0.110		ornamental trees	-0.023
behavior	Recycle	0.275		Recycle	0.223
	Buy Recycled	0.153		Buy Recycled	0.196
	Purchase local	0.382		Purchase local	0.249
	Purchase Organic	0.526		Purchase Organic	0.247
	Outdoor Activities	0.477		Outdoor Activities	0.442

# Appendix F - Results from the Johnson County Transit Center Questionnaire

## Quantitative Results

Prairie	avg. preference	2.34			
	avg. beauty	2.31			
	avg. natural	3.00			
	avg. order	2.03			
	avg. color	2.83			
	avg. level of safety	2.45			
	frequency of visits	1	daily		
	fav. time of year	1	Spring		
	what are native plants (do they know)	0	No	assume those that did not respond do not know	
	what are native plants (do they know)	1	yes	took out non-response	
	What are benefits of native plants (do they know)	0	No	assume those that did not respond do not know	
	What are benefits of native plants (do they know)	1	yes	took out non-response	
age info	mode age range	3	36-50		
	% of 1 (0)	0.00%			
	% of 2 (4)	13.79%			
	% of 3 (12)	41.38%			
	% of 4 (11)	37.93%			
	% of non response (2)	6.90%			
education info	mode education level	3	Bachelor's degree	but actually, no response was the most given answer	
	% of 1 (1)	3.45%	High school diploma		
	% of 2 (7)	24.14%	assoc. or some college		
	% of 3 (9)	31.03%	Bachelor's degree		
	% of 4 (2)	6.90%	Master's or PhD		

	% of non response (10)	34.48%	No response	assume only have a high school diploma, otherwise why would it matter	
extra classes	mode - yes or no to extra classes or seminars	0	no		
	# of yes	12			
	# of no response	4			
live	mode - place type	2	suburban		
	% rural (3)	10.34%			
	% suburban (17)	58.62%			
	% metro (7)	24.14%			
	% no response (2)	6.90%			
grow up	mode - place type	2	suburban		
	% rural (9)	31.03%			
	% suburban (10)	34.48%			
	% metro (8)	27.59%			
	% no response (2)	6.90%			
	mode - residence type	1	single family		
	own yes or no	1	yes		
	# of no response	2			
at place of residence	turf	1	# of yes 26	# of no 1	# of no response 2
	native grasses	0	# of yes 4	# of no 23	# of no response 2
	perennials	0	# of yes 12	# of no 15	# of no response 2
	annual beds	0	# of yes 8	# of no 19	# of no response 2
	native forbs	0	# of yes 6	# of no 21	# of no response 2
	native shrubs	0	# of yes 1	# of no 26	# of no response 2
	ornamental shrubs	0	# of yes 11	# of no 16	# of no response 2
	native trees	1	# of yes 17	# of no 10	# of no response 2
	ornamental trees	0	# of yes 7	# of no 20	# of no response 2
Ideal aspect	low maintenance	0	# of yes 9	# of no 18	# of no response 2
	low water needs	0	# of yes 1	# of no 26	# of no response 2
	neat and tidy	0	# of yes 8	# of no 19	# of no response 2
	lawn	0	# of yes 7	# of no 20	# of no response 2
	sustainable	0	# of yes 2	# of no 25	# of no response 2
	Sustainability what is it (do they know)	0	nope	assume no response = no knowledge	
	Sustainability what is it (do they know)	1	yes	non-responses were omitted	
	recycle	1	yes		
	buy recycled products	1	yes		

	purchase local	1	yes		
	purchase organic	1	yes		
	outdoor activities	0	# of yes 14	# of no 5	# of no response 10

### Correlations to Preference

<b>Parking Lot</b>			
	Education to Preference	0.557	assumed the no answer was high school only
	Native plant knowledge to preference	0.430	no response was taken to mean no knowledge
	Native plant knowledge to preference	0.249	Took out non-responses
	5 point scale knowledge	0.413	Took out non-responses
	Benefits knowledge to Preference	0.134	no response was taken to mean no knowledge
	Benefits knowledge to Preference	0.097	Took out non-responses
	5 point scale benefits	0.510	Took out non-responses
	Level of safety to Preference	0.907	
	Age to Preference	-0.274	no response surveys were omitted in the correlation
	Extra classes to preference	0.233	no response surveys were omitted in the correlation
	Place type live to Preference		
	reversed #s	-0.022	no response surveys were omitted in the correlation
	Place type grow up to Preference		

	reversed #s	0.084	no response surveys were omitted in the correlation
	Sustainability knowledge to preference	0.206	no responses were taken as no knowledge of sustainability
	Sustainability knowledge to preference	-0.098	No response surveys were omitted
	5 point scale	0.383	No response surveys were omitted
important aspects	Low Maintenance to Preference	0.196	no response surveys were omitted in the correlation
	Low water needs to Preference	0.218	no response surveys were omitted in the correlation
	Neat and Tidy to Preference	-0.219	no response surveys were omitted in the correlation
	Lawn to Preference	-0.207	no response surveys were omitted in the correlation
	Sustainable to Preference	0.217	no response surveys were omitted in the correlation
landscape at residence	Turf to Preference	0.183	no response surveys were omitted in the correlation
	Native Grasses	0.179	no response surveys were omitted in the correlation
	Perennials	0.383	no response surveys were omitted in the correlation
	annual beds	0.168	no response surveys were omitted in the correlation
	native forbs	0.047	no response surveys were omitted in the correlation
	native shrubs	-0.183	no response surveys were omitted in the correlation

	ornamental shrubs	0.458	no response surveys were omitted in the correlation
	native trees	0.402	no response surveys were omitted in the correlation
	ornamental trees	0.196	no response surveys were omitted in the correlation
behavior	Recycle	0.315	no response surveys were omitted in the correlation
	Buy Recycled	0.013	no response surveys were omitted in the correlation
	Purchase local	-0.311	no response surveys were omitted in the correlation
	Purchase Organic	-0.161	no response surveys were omitted in the correlation
	Outdoor Activities	0.282	no response surveys were omitted in the correlation

## **Appendix G - Checklist**

### **Plant Selection**

Plant species should include:

A combination of native grasses, forbs, shrubs, and trees.

A larger percentage of native forbs than native grasses for color and texture enhancement.

The inclusion of native shrubs and trees to further provide textural enhancement.

### **Maintenance**

Maintenance should include:

A well maintained buffer along all edges of the naturalistic landscape that border a circulation path.

A well maintained buffer around all way-finding material.

A well maintained buffer along any other area that would need to look neat and tidy.

### **Elements for Perceived Safety**

Elements should include:

Buffers along circulation paths and at the entrance of buildings.

Clear visual paths of oncoming traffic

Clear visual paths around areas where threats could be lying in wait.

### **Elements for Activities**

Elements should include:

Areas for scheduled events such as gathering spaces and amphitheaters.

Elements for both scheduled and non-scheduled events such as trails and seating areas.

## **Educational Information and Signage**

Elements should include:

Signage that is high in color and contains illustrations, pictures and as little text as possible.

Signage that will catch the attention of visitors and be easily remembered.

Extra information such as pamphlets should be provided for those who wish to learn more than what is illustrated on the signage.