ASSESSING RESIDENTS' PERCEPTIONS OF WATERFRONT LANDSCAPES IN LAS COLINAS URBAN CENTER, IRVING, TEXAS

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ABSTRACT

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The purpose of this study is to assess the residents' perceptions of the waterfront landscapes in man-made environments, specifically in the Las Colinas Urban Center, Irving, Texas. From in-depth interviews and passive observations, this research identifies and reviews the specific landscape design characteristics of waterfront landscapes that influence people's decisions to live near water. These specific landscape design characteristics are categorized into three dimensions: elements and features, water characteristics, and accessibility. Understanding how these three dimensions influence intention to live in close proximity to a waterfront landscape are used to provide recommendations for the future design of waterfront development.

Most ancient societies flourished in waterfront areas, such as next to the Nile, the Tigris, and the Euphrates, and they did so because of reasons such as transportation, agriculture, safety, and aesthetics. Because most people seem to enjoy living close to the water, many famous cities are located around waterfront areas. Various researchers have discussed the design characteristics that make the waterfront landscape more attractive, such as accessibility, feeling of safety (Butler, 2001), picturesque and memorable scenes (Gabr, 2002), and connectivity (Graham et al., 2009). Moreover, successful waterfront landscape projects offer numerous benefits to their nearby residents (Hou, 2009). For example, they can improve the environment by providing an attractive place for people to gather and increase revenue by

promoting job opportunities and accelerating new investments (Hou, 2009). This research is an attempt to understand such conditions in the man-made waterfront environment.

This research uses qualitative methods to assess the waterfront landscapes of the Las Colinas Urban Center in Irving, Texas. Resident perception is assessed using in-depth interviews (Taylor and Bogdan, 1998) while passive observation techniques (Francis, 2002) are used to record and document the researcher's observations of the landscape design characteristics of waterfronts. The in-depth interviews specifically focus on the residents' perceptions of the landscape design characteristics of the Las Colinas Urban Center in terms of waterfront elements and features, water characteristics, and accessibility. Interview data are analyzed according to the grounded theory approach (Taylor and Bogdan, 1998). After the interview data are transcribed, key words are used to draw themes (Sommer, 1991). The observations of the landscape design characteristics, including the water body, edges, pathways, connections between the multi-family residences and the waterfront, sitting spaces, and the planting materials, are recorded in photographs. These data from the observations and the data from the interviews are compared with secondary data from the literature review to examine the residents' perceptions of the landscape design characteristics of the Las Colinas Urban Center.

In conclusion, according to the results of this research, the landscape design characteristics of Las Calinas Urban Center do have a strong impact on people's decisions about their living area. Therefore, during the design process, developers and designers should fully consider the resident's perceptions of man-made waterfront projects so they can both benefit the users and enhance the further development around it.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF TABLES

CHAPTER 1

INTRODUCTION

1.1 Introduction

The purpose of this research is to assess the residents' perceptions of waterfront landscapes in the Las Colinas Urban Center, Irving, Texas. This chapter covers the motivation for this research and why this research is important for waterfront landscape design in the future. In addition, this chapter explains the definitions of special terms, research methods, and the significance and limitations of this research.

Designers, planners, and researchers interested in environmental behaviors have shown that water is one of the most attractive and important elements of landscape design (Hubbard and Hubbard, 1917; Wright, 1928; Bachelard, 1983; Pitt, 1989; Kaplan and Kaplan, 1989; Kaltenborn and Bjerke, 2002). Humans usually chose to settle around water because of the resources that water provides (Faggi et al., 2011). In addition, human's perceptions of water continuously change and have become more diversified than ever before. According to Burmil, Daniel and Hetherington (1998), water has been found to be important to human's perceptual evaluations of landscape scenic quality and to the quality of many outdoor recreation experiences. Therefore, the design characteristics of waterfront landscapes that make the landscape attractive and enjoyable become more important for future development.

1.2 Problem Statement

In many American cities, waterfront development is an important element of commercial and residential development. Many residents want to have a better connection with the nature around their living environment (Warrick and Alexander, 1998). Water is considered as a part of nature and provides many opportunities for wildlife and human activity (Faggi et al., 2011). In addition, according to Olivia (2006), the development on the waterfront has had a positive

impact on housing prices. Developers should consider how to accommodate the growth of development, enhance the natural resources, and increase the satisfaction of their residents at the same time (Platt, 2011). Making the waterfront area more attractive and accessible can better serve the residents. Also, since the waterfront landscapes are important for residents' choice for their living place, landscape architects should think more about why waterfront landscapes play such an important role for people in choosing their dwellings.

1.3 Purpose of the Research

The purpose of this research is to understand what landscape design characteristics of waterfront landscapes in the Las Colinas Urban Center attract people most. Specifically, this research assesses these landscape design characteristics and categorizes them into elements and features, water characteristics, and accessibility. This study on waterfront landscapes also provides future designers and developers valuable information about waterfront design and development.

This study investigates the residents' perceptions of the waterfront landscapes in the Las Colinas Urban Center through interviews. The responses are analyzed according to grounded theory (Taylor and Bogdan, 1998). The conclusions of this study provide more information and opportunities for future developers and landscape architects to design the waterfront landscapes that could enrich residents' daily lives.

Therefore, the goals of this research are to assess residents' perceptions of the waterfront landscape design characteristics of the Las Colinas Urban Center, Irving, Texas in terms of elements and features, water characteristics, and accessibility; to explore how to improve the waterfront landscapes of the Las Colinas Urban Center; and also to provide recommendations for future developers and landscape architects about waterfront development and design.

1.4 Research Questions

This research addresses four major questions:

1. What are the residents' perceptions of the landscape design characteristics, specifically the elements and features of waterfront landscapes of the Las Colinas Urban Center, Irving, Texas?
2. What are the residents' perceptions of the water characteristics of the Las Colinas Urban Center, Irving, Texas?
3. What are the residents' perceptions of the accessibility to the water and waterfront landscapes in the Las Colinas Urban Center, Irving, Texas?
4. How does this information help landscape architects improve the future design of waterfront landscapes in a man-made environment?

1.5 Definition of Terms

Accessibility: Accessibility is the ease by which people can reach their desired activity sites, such as those offering employment, shopping, medical care, or recreation (Hanson, 2009, p. 2). In this research, accessibility refers to people's visual or physical connectivity with water or waterfront landscapes.

Class A: A rating usually assigned to properties that will generate the maximum rent per square foot, due to superior quality and/or location.

Class B: A rating usually assigned to a property that most potential tenants would find desirable but lacks certain attributes that would result in maximum rents per square foot.

Class C: A rating usually assigned to a property that is physically acceptable but offers few amenities; as a result the rent per square foot will be low.

Canal: The canal in this research refers to the Mandalay Canal which starts connecting to the Lake Carolyn in the north and ends at the south of the Brazos Drive in the Las Colinas Urban Center, Irving, Texas.

Elements and features: For the purpose of this research, elements are the design characteristics of the waterfront landscapes in the Las Colinas Urban Center such as the benches, lighting, bridges, overhead structures, sculptures, trees, and other physical structures.

Features are the design characteristics of the waterfront landscapes in the Las Colinas Urban Center, either developed areas such as the plaza, sitting spaces, trail system and canal, greenery, or other undeveloped areas.

Perception: “The organization, identification, and interpretation of a sensation in order to form a mental representation” (Schacter and Gilbert, 2011, p. 127).

Qualitative technique: Qualitative techniques explore answers to broad questions and gather descriptive data from participants (Taylor and Bogdan, 1998).

Residents: For the purposes of this research, residents are people living at the Las Colinas Urban Center, Irving, Texas.

The Las Colinas Urban Center: The Las Colinas Urban Center is part of the master plan of Las Colinas, Irving, Texas, which was proposed by Ben Carpenter and Ernest J. Kump Associates in 1971 (Las Colinas Association, 2007). For the purposes of this research, Las Colinas Urban Center is surrounded by John W. Carpenter freeway on the west, Riverside Drive on the east and south, and W. Northwest highway on the north.

Water characteristics: For the purpose of this research, water characteristics refers to the color, movement, size, sound, and other visual qualities of the water.

Waterfront: Wrenn (1983) explains that a waterfront is a unique and irreplaceable resource, the interface between land, water, air, sun and plants. In addition, Breen (1996) and Rigby (1994) suggest that waterfront properties do not necessarily need to directly fronting to water, but may only need to look attached to the water. According to Rigby (1994), in some cases, commanding a view of water can be considered as a waterfront property.

Waterfront landscapes: For the purpose of this research, waterfront landscapes are the landscapes that directly fronting to water (Lake Carolyn or Mandalay Canal) or have visual connection to the water.

Waterfront landscapes design characteristics: For the purpose of this research, waterfront landscapes design characteristics are categorized into four dimensions: elements and features, water characteristics, accessibility, and aesthetics.

Waterscapes: According to Herzog (1985), waterscapes are, for example, “waterfalls, mountain streams, rivers, lakes (large and small), ponds, creeks and swamps” (p. 228).

1.6 Research Method

This study uses qualitative techniques (Taylor and Bogdan, 1998) to assess the residents’ perceptions of the waterfront landscapes design characteristics of the Las Colinas Urban Center, Irving, Texas. The landscape design characteristics and residents’ perceptions are explored by onsite passive observations and in-depth interviews with residents who live in the Las Colinas Urban Center, Irving, Texas. The process of this research includes examining the literature to determine the landscape design characteristics of waterfront landscapes, conducting onsite passive observations to identify the landscape design characteristics that are present in the site (Francis, 2002), interviewing residents who live in the Las Colinas Urban Center to explore their perceptions of the waterfront landscapes (Taylor and Bogdan, 1998), and then analyzing the interview data and comparing it with the secondary data from the literature review to find ways to improve the future designs of waterfront landscapes.

1.7 Significance and Limitations

This study provides valuable conclusions and suggestions on waterfront design and development for landscape architects and developers. This research, which identifies those landscape design characteristics of waterfront landscapes that are perceived as most influential by residents, could be used for further studies on how to improve the future designs and developments of waterfront projects.

There are some limitations in this research. Differences in education backgrounds, ages, cultures, and gender may influence the perceptions of waterfront landscapes. Moreover, the Las Colinas Urban Center is the only study area, and may not fully represent people’s perceptions

of waterfront landscapes. Furthermore, since the research is focused on the residents' perceptions of waterfront landscapes, it may not be useful to other population groups.

1.8 Summary

Waterfront landscape development is typically a focal point for designers. This research mainly focuses on residents' perceptions of landscape design characteristics of the waterfront landscapes in the Las Colinas Urban Center, Irving, Texas. It shows waterfront landscapes do affect people's feelings and their choice for living area, identifies which landscape design characteristics of waterfront landscapes are perceived to be most influential, and explains how to improve the design and development of waterfront landscapes through these identified landscape design characteristics. The remainder of this research includes Chapter 2 Literature Review, which discusses the landscape design characteristics of waterfronts, human perceptions of these characteristics, and examples of waterfront projects. Chapter 3 Methodology introduces the interview questions, explains how participants are recruited, and details the site selection. Chapter 4 Analysis and Findings reports on the overall summary of the data, and Chapter 5 Conclusion answers the research questions, indicates the relevance of this study to landscape architecture, and identifies areas of potential future research.

CHAPTER 2

LITERITURE REVIEW

2.1 Introduction

This chapter contains the review of the literature and research about waterfront landscapes and its history. Moreover, a review of human perception and its importance is examined in this chapter. Furthermore, the background of the Las Colinas Urban Center, Irving, Texas, and its basic information, such as location, land use, a map of the current Las Colinas Urban Center and the development around it are also presented in this chapter.

2.2 Waterfront Landscapes

Humans have been interested in living near water since ancient times (Faggi et al., 2011). In the past, many waterfront areas were for settlements where people could raise their families. Water served as an important resource for supporting their lives (Faggi et al., 2011). Then, as societies became more aware of each other, water also acted as a defense element. In addition, as cultures developed, water started working as an aesthetic element in the design process (Hubbard and Hubbard, 1971; Wright, 1928). Therefore, waterfront development is a well-established international phenomenon (Dong, 2004).

2.2.1. Definition of Waterfront

According to Dong (2004), because of the meaning of the word ‘waterfront’ is clear and easy to understand, its evident definition is not well developed in the literature. Also, some other terms with a similar meaning to ‘waterfront’ are used in different articles, such as harbourfront (e.g. in Vallentin, 1991), cityport (e.g. in Tunbridge and Ashworth, 1992; Hoyle, 2002), riveredge (e.g. in Watson, 1986), and many others.

The definition in the Oxford American Dictionary of Current English of a waterfront is “the part of a town or city adjoining a river, lake, harbor, etc.” Wrenn (1983) explains that a waterfront is the interface between water, air, land, sun, and plants. The US Federal Coastal Zone Management Act (OOCR, 1972: Section 306A (a) (2)), Office of Ocean and Coastal

Resources officially defines a waterfront as “any developed [waterfront] area that is densely populated and is being used for, or has been used for, urban residential, recreational, commercial, shipping, or industrial purposes” (p. 103).

According to Zhang (2002), a waterfront is a place that integrates land with water, a place that people are naturally attracted to. Moreover, Breen and Rigby (1996) suggest that the property of a waterfront does not need to be directly connected to water. According to them, the visual connection to the water is also considered as waterfront property. Finally, Ryckbost (2005) maintains that a waterfront is “any property that has a strong visual or physical connection to water”.

2.2.2. Types of Waterfronts

According to Ryckbost (2005), a waterfront can be a lake, stream, river, or ocean. Herzog (1985) points out that a waterfront could be described as mountain waterscapes, swampy areas, rivers, lakes, ponds, or large bodies of water. According to Kos (2012), an oceanfront, innercoastal waterway, river, creek, lake, pond, lagoon, canal, or marsh could be considered as waterfront. Kos also asserts that the size of the waterfront may be less than a quarter acre or over 600 acres. Finally, Breen and Rigby (1994) believe that the water body of a waterfront could be a bay, ocean, creek, lake, river, or canal. They also explain that a waterfront project may include buildings that may not be directly built on the water but that have the visual connection to water or are a part of the master plan.

According to Meldrum (1965), waterfronts are categorized into three types: public, private, and improvised. The public waterfront refers to a large sandy stretch open to the public and patrolled by lifeguards. The private waterfront refers to a swimming area at a house or camping area. During a camping trip, the swimming area used by a family is referred to as an improvised waterfront.

2.2.3 Historical Progression of Waterfronts

According to the Seattle Department of Planning and Design (2006), the first waterfronts were coastal seaports. As the primary mode of transportation to carry goods and people, where ships could move and dock became the center of most transportation related activities. These ports served as staging areas for increased transport and further development. As Hoyle (1998) explains, “the coexistence of a primitive port and city involved close spatial association and maximum functional interdependence. In medieval city-ports the urban center was dominated by merchants’ houses and the waterfront represented the focal point of the settlement as a whole” (p. 5).

The second step of the development of waterfronts was the birth of the industrial center, which aided shipping and manufacturing (Seattle Department of Planning and Design, 2006). Due to increased ship sizes and advanced shipping methods, more docking structures and cargo storage infrastructure were built. The waterfront influenced the urban morphology by extending its land use (Minica, 1995). These port cities served as centers for an exchange of ideas, information, and other cultural happenings. According to Vallega (1993), waterfronts create a natural spatial environment that includes maritime trade and navigation.

During the final stage of waterfront development, according to the Seattle Department of Planning and Design, waterfronts evolved with the changing economies and changing land-uses. As the shipping industry gradually became replaced by the trucking industry, the large industrial waterfronts were abandoned by people. According to Hoyle (1988), this was the ideal opportunity for urban planners and designers to redevelop these abandoned industrial port-based waterfronts into marinas, housing, restaurants, and shopping centers that include water-based recreation facilities.

Section 2.5 discusses more contemporary uses of current use of the waterfront areas.

2.3 Landscape Design Characteristics of Waterfronts

2.3.1 Elements and Features

In their book *Water and Landscape*, Litton et al., (1974) create a classification scheme for systematically and objectively measuring and evaluating water in landscapes (Figure 2-1). Their scheme has three units of varying complexity but with visual continuity: the landscape unit, the setting unit, and the waterscape unit. The landscape unit generally represents a larger scale unit with repeating water and vegetation patterns, and with clear or fuzzy boundary conditions. The setting unit is described by Litton et al. as an area of space defined or enclosed by specific land forms, such as a forest edge, and is a combination of landscape expression and water expression. According to them, whereas a setting unit includes a single water body, a landscape unit is comprised of multiple repeated water bodies. Finally, Litton et al. say the waterscape unit includes the water element and the shore element.

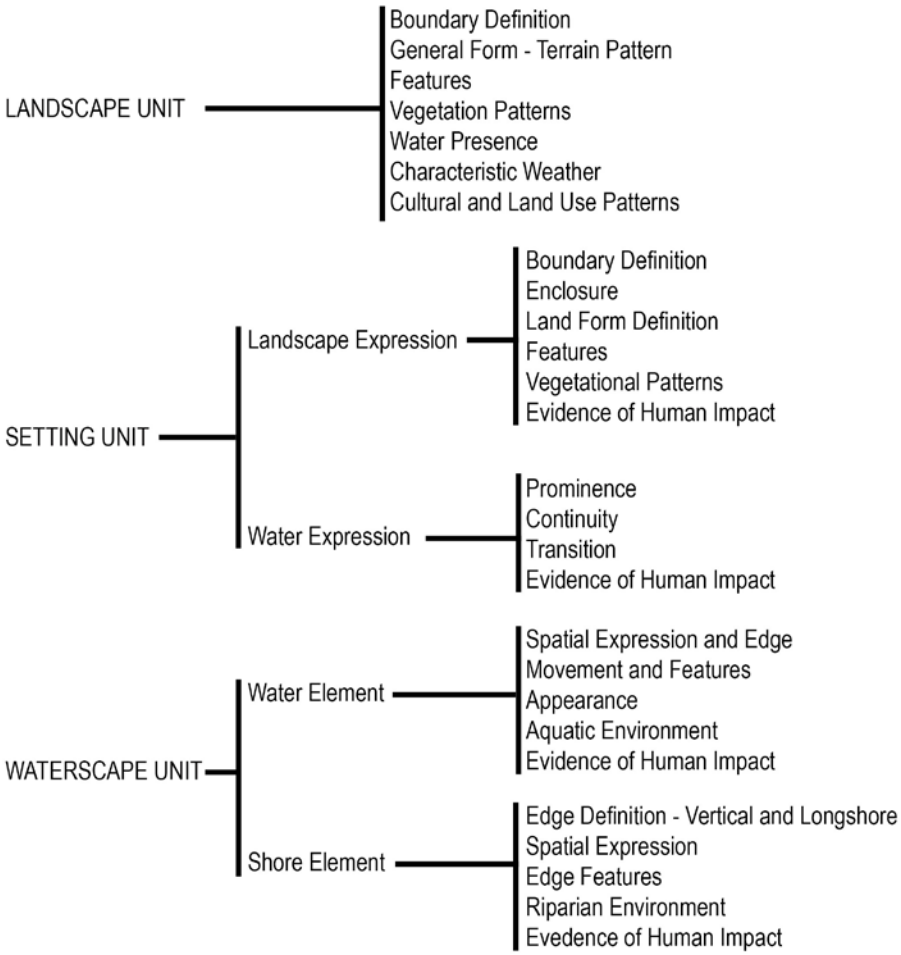


Figure 2-1 Classification Framework (Source: *Water and Landscape* Litton et al., 1974)

The setting unit presents a useful way to evaluate the characteristics of a waterscape from a distance. In addition, as Litton et al. (1974) discuss, because water is so tightly integrated into the landform elements of a waterscape, separating the two is a difficult task. However, they ascribe six factors to landscape expression to help tease the two apart: boundary definition, enclosure, landforms, features, vegetation patterns, and evidence of human impact. Boundary definition refers to the visual outline or edges evidenced by a contrast of materials, textures, or colors; for example, the contrasts between the skyline, water surface, vegetation, and land. In addition, whereas boundary definition is seen on a one-dimensional scale, enclosure refers to visual relationships on a three-dimensional scale with various vertical

and horizontal proportions; for example, the proportions of a basin versus those of a lake. The combination of boundary definition and enclosures creates three different types of landforms: flattened or slightly sloped, rolling hills, or irregularly shaped mountains (Litton et al., 1974). According to the authors, only one of these types of enclosures should be represented in a setting unit. Moreover, tree cover, scrub cover, grassland, and barren soil are the four types of vegetation patters identified by Litton et al. These patterns are marked by a uniform and repetitive texture. Features refer to the individual elements that are separated from the surrounding environment, usually by color or simply the outline of their silhouette. Peaks, pinnacles, cliffs, and outcrops are examples of geological features; waterfalls, pools, and streams are examples of water features; and individual trees or more commonly tree groupings are examples of plant features. Finally, human impact is evidenced by the developments that impinge upon nature, such as nature trails, resorts, or dam buildings.

In addition to the landscape expression component of the setting unit, Litton et al. (1974) discuss water expression as an essential component that cannot be separated from the land that contains it. As with landscape expression, water expression can be further divided into four factors: prominence, continuity, transition, and human impact. Prominence refers to the relative dominance of the water in the setting unit. For example, a river may be the most noticeable feature in rather flat setting, but over time as the river creates a gorge, that part of the setting unit becomes more dominant. Continuity as described by Litton et al. is contrast with variety. For example, a stream might be comprised of slow moving and turbulent sections. The relative proportion of these types of sections over the setting unit defines its continuity. Transition refers to the point of linkage between the water and the land, for example as a sandy or swampy shore. These may be either physical or visual. Finally, the evidence of human impact as a factor in water expression is the same as in landscape expression.

Similar to Litton et al. (1974), Yamashita (2002) also investigates elements and features of waterfronts. In Yamashita's research, participants were asked to verbally describe pictures of

waterfronts. From their verbal descriptions, the author identified fourteen evaluative categories and key expressions. The fourteen categories are litter, river channel/riverside micro topography, water, river improvement work, vegetation, facility for private use, path, building, unoccupied lot, scenery, bridge, human activity, animal, and ephemeral factor (see Table 2-1). As shown in this figure, the key expressions work as examples of the fourteen identified categories; i.e., the setting sun is an example of the ephemeral factor.

1.Table 2-1 Categories and key expressions of subjects for photography identified in verbal descriptions of scenes (Source: Yamashita, 2002 P. 23)

Category	Key expression[a]
Litter	Litter, garbage, trash, dead grass, sludge and foam in wastewater, can, dead tree, ball, tire, bicycle, motorbike, bottle, fire extinguisher, dead fish/shellfish, oil spill, ashes, roof tile, brick, tinplate
River channel/riverside micro topography	Sandbar, islet, sand, rock, stone, shore, sediment, unchanged in form, wide, large, small, river bed, water edge, confluence, divergence, L-/S-shaped, crisscrossing, without revetment, river name (the Chikugo, the Kose, the Mitsuru, etc.), riverside place for fishing/washing/play with water
Water	Flow, fast, slow, gentle, amount, depth, level, falling, gushing, rice fields, farming, extinguishing fires, park maintenance, washing, domestic use, water surface, reflection, expression, pure, cold, clean, impure, water quality, wastewater
River improvement work	Revetment, steps for the washing place, tetra pod, fish way, weir, dam, sluice, water gate, levee, groundsill, river works
Vegetation	Weed, moss, grass, flower, aster, rice field, pine, wax tree, grapevine, maple, apricot, willow, trees, woods, reed, antirrhinum, waterweed, bamboo
Facility for private use	Statue of water imp, fence, guide map, windmill, billboard, swing
Path	Path, farm/aster-lined road, approach road for fire engines, riverside promenade, course for waking/cycling/commuting,
Building	House, housing complex, villa, wastewater treatment plant, incinerator, school, tree-planting center, spa facility, senior citizen's center, town office, temple, shrine, monument, pumping/observatory station, water storage tank, irrigation building, watermill, waterworks
Unoccupied lot	Field, uncultivated land, old burial mound, ground
Scenery	Distant mountains, landscape, townscape, riverscape, peaceful/traditional/preferable/worth-preserving scenery
Bridge	Bridge names (Murashima, Baba, etc.), wood/refurbished/suspension bridge
Human activity	Child's play, festival, enjoying the cool breeze, angling, fishing, walking, biking, swimming, boating, canoeing, flying kites, bonfire, dumping rubbish
Animal	Duck, bird, heron, swallow, dub, bug, water skipper, dragonfly, dragonfly nymph, spider, beetle, firebug, mantis, cricket, butterfly, water beetle, grasshopper, cicada, pill bug, frog, tadpole, carp, mud snail, fish, sweetfish, killifish, crab, crawfish, turtle, loach, fresh-water mussel, animal, cow, pony, horse, cat, snake
Ephemeral factor	Sunset, setting sun

[a] Translated from the original Japanese expressions with contexts taken into consideration.

In this thesis, the elements and features of waterfront landscapes that are examined at the Las Colinas Urban Center are studied in terms of the factors of landscape expression defined by Litton et al. (1974) and the fourteen categories of waterfront depictions identified by Yamashita (2002). The following section discusses the water characteristics of waterfront landscapes, and is also informed by the research of Litton et al. (1974) and Yamashita (2002).

2.3.2 Water Characteristics

One of the most important elements in landscape design is water. As Litton (1977) explains, “Water in the landscape tends to be dominant because of its visibility, its movement, reflections, and color, its consequent contrasts to adjacent earth surfaces” (p. 48). These are visual qualities of water. When people observe water, according to Litton (1977), they usually focus on these visual qualities and use them to subjectively rate the scene.

In addition, the waterscape unit is the third classification framework introduced by Litton et al. (1974), and as with the setting unit, the waterscape unit can be further subdivided into the water and shore elements (Figure 2-1). Furthermore, the water element subsumes five factors: spatial expression and edge, movement and features, appearance, aquatic environment, and evidence of human contact. According to the authors, the first element, space, refers to the dimension in the unit that the water occupies. The size and shape of the water body are defined by both external and internal edges. The external edge refers to the land surrounding the water and the internal edge refers to land that is surrounded by water.

Litton et al. (1974) point out that movement of water may be caused by gravity, wind, or the two in combination. For example, gravity creates the flow of a stream, and wind can drive waves on a lake. The contrast between different types of movement, for example between fast and slow or between flat or falling, creates features in water such as falls and pools. According to Yamashita (2002), adults are more focused on the flow rate of the water, which the author refers to as the movement of the water. Moreover, Litten et al. (1974) maintain that fluidity, clarity, color, and reflective capacity are ways to describe water’s appearance. In addition, Burmil et al. (1998) also mentioned in the research that the color belongs to appearance of the water. The aquatic environment is the plants and animals that exist within the waterscape. According to the authors, these plants and animals introduce a kind of transition beyond landforms to the edge and may enrich visual appeal of the environment. Finally, according to Litton et al., evidence of human impact can be seen when human activity purposefully or

through indirect means such as pollution affect the flow or configuration of water. In addition to Litton et al., Butler (2001) suggests that evidence of human impact in waterfront developments can be seen in such measures as bridges, lighting, shops, or unique architectural accents.

In addition to the water element, according to Litton et al. (1974) the shore element is the other part of the waterscape unit. The shore is designated as the area where humans are viewing or actively enjoying the water. The five factors that of the shore element are the edge definition, spatial expression, edge features, riparian environment, and evidence of human impact. The edge is defined by both its horizontal and vertical portions. The edge that is parallel with the water is the horizontal edge, also called the long shore. The edge that is perpendicular to the water is the vertical edge, also called the cross shore. For the shore element, spatial expression is defined by both the distance between long shores and the height of the cross shore. Focal points along the shore such as rock outcrops, bluffs, caves, and boulders are part of the edge features. The riparian environment refers to the space that includes the edges of a water body and the vegetation contained therein. Examples of evidence of human impact include the buildings, docks, and bridges built upon a shore environment.

Similar to Litton et al.'s (1974) classification framework for systematically recognizing and evaluating land and water elements, Burmil, Daniel, and Hetherington (1998), also point out various characteristics of water that are subject to human perceptions. According to Burmil et al. (1998), water acts as a primary landscape element, and as a unique material in nature, water has several defining characteristics perceived by humans: surface, reflection, color, and the shape of its container, and sound. For example, with a calm surface, people will notice the surrounding objects are reflected by the water, often with great detail. When water has more flow, the reflection loses its sharpness and the surrounding images are blurred. Furthermore, different materials that are contained in water reflect different colors. Because water has no inherent shape, it naturally forms to its container. The shape of the container affects the ways in which water acts, for example, its flow or drop, such as in streams, creeks, lakes, ponds, rivers,

and oceans (Burmil et al., 1998). Finally, sound is created either by the water itself or by other objects and animals interacting with the water. This is important because as Burmil et al. (1998) say, “Water can reveal itself in sound even when it is hidden from sight” (p. 100).

Finally, as discussed in section 2.3.1, Yamashita (2002) asked participants to verbally describe pictures of waterfronts from which fourteen evaluative categories are derived. The category of water is further subdivided into four characteristics: flow rate, surface conditions, quality, and usage (see Table 2-2). Participants in this study describe the flow rate using words like flow, fast, slow, gentle, amount, depth, level, falling, and gushing. They describe water surface conditions using words like water surface, reflection, and expression. Pure, cold, clean, impure, water quality, and wastewater are the words used to explain water quality. The usage of water is explained with words such as rice fields, farming, extinguishing fires, park maintenance, washing, and domestic use.

Table 2-2 Categories, key expressions, and examples of verbally described features of water

(Source: Yamashita, 2002 P. 25)

Category	Key expression[a]	Example
Flow rate	Flow, fast, slow, gentle, amount, depth, level, falling, gushing	“The river flows faster and its water level is higher than usual” (adult)
Surface conditions	Water surface, reflection, expression	“The river reflects nature; it is like a mirror, reflecting the sunset off the water” (adult).
Quality	Pure, cold, clean, impure, water quality, wastewater	“The river is so clean, I am taking the picture. The water is so clean” (child).
Usage	Rice fields, farming, extinguishing fires, park maintenance, washing, domestic use	“The water used in rice fields runs out of here; the used water runs into the Mitsuru River” (child).

[a] Translated from the original Japanese expressions with contexts taken into consideration.

In this thesis, the characteristics of water that are examined at the Las Colinas Urban Center are studied in terms of the factors of water elements defined by Litton et al. (1974), the characteristics of water discussed by Burmil et al. (1998), and the four sub-categories of water identified by Yamashita (2002).

Table 2-3 Characteristics of Water

Litton, Tetlow, Sorensen and Beatty, 1974	Burmil, Daniel and Hetherington, 1998	Yamashita, 2002
Role of water in landscape, nature and urban	Environmental values, arid landscape, water values	Landscape assessment, water, perception
Water elements	Sculpturing effects of water	Features of water
Appearance	Amount of particulates carried	Flow rate
Aquatic environment	Duration of flow and type	Surface conditions
Evidence of human impact	Nature of the ground materials	Usage
Movement and features	Quantity of water	Water quality
Spatial expression and edge	*Water characteristics*	
	Calm/ reflective	
	Color	
	Shape of container	
	Sound	
	Surface	

2.3.3 Accessibility

According to Price (2008), the cultural and aesthetic services produced by the diversity of landscapes and their features are important. In addition, Faggi (2013) argues that landscape preferences are significantly driven by accessibility to and the visual presence of water. Moreover, according to Gerald's (1995) research, difficulty in accessing the water leads to negative attitudes to a waterfront. In addition, per the results of a land use survey given by the students of the Graduate Program in Community Planning and Area Development at the University of Rhode Island, there is a need for improved access to the water and public areas in waterfront areas. In fact, one criteria to measure a successful waterfront, according to Butler (2001), is accessibility. Therefore, accessibility to waterfront landscapes is an important landscape design characteristic in the study of waterfront landscapes.

2.4 Human Perception

Perception is explained by Schacter (2011, p. 20) as “the organization, identification, and interpretation of sensory information in order to represent and understand the environment.” It is shaped by learning, expectation, attention, and memory (Gregory, 1987; Bernstein, 2010).

Landscape perception is the interaction between people and the landscape (Zube et al., 1982). People’s previous knowledge and experience, familiarity with the landscape, attitudes, and cultural background are important components that contribute to perception (Bradley and Kearney, 2007; Kaplan and Kaplan, 1989; Karjalainen, 1996; Ribe, 2002; Virden and Walker, 1999). Therefore, differences in landscape perception are based on differences among individuals and groups with similar traits (Kaplan and Kaplan, 1989). Furthermore, landscape perception influences individual preferences.

Ryan (2006) points out that in some cases, architects, designers, and planners may not fully understand a development project’s needs as much as the local residents and home owners. In addition, the difference in opinion between these experts and locals may create financial, usage, or aesthetic problems. Therefore, during the design process, it is important to consider not only expert opinion but also user perception.

2.4.1 Perceptions of Waterfront Elements and Features

According to Herzog (1985), there are six predictor variables used to measure preference for waterscapes: identifiability, coherence, spaciousness, complexity, mystery, and texture. Identifiability refers to sense of familiarity a person has for a scene or the ease with which an individual can relate with a scene, not actual familiarity with it. Coherence is a measure of how well a person can use parts of a scene to predict other possibly hidden parts. Spaciousness refers to the amount of space between elements in a scene that a person may walk around in. This is in contrast to complexity, which refers to the number of elements in a scene or a scene that takes much time to visually process. A scene that has mystery suggests that there are a number of interesting elements hidden about a scene but requires one to walk

around to discover. Finally, texture refers to the relative level of graininess of the ground surface or any object covering the ground surface.

Herzog (1985), showed seventy color slides of some sort of waterscape, such as waterfalls, mountain streams, rivers, lakes, ponds, and swamps, to 259 university students and asked them to rate the scenes on a scale of 1 (low) to 5 (high) in terms of the six predictor variables discussed above. In addition to the six predictor variables, all participants were asked to rate the scenes in terms of preference, meaning how much they liked the scene.

Based on the similarities among the seventy scenes, Herzog (1985) divided them into four dimensions: mountain waterscapes; swampy areas; rivers, lakes, and ponds; and large bodies of water. In addition, the results of this study show that waterscapes with high levels of spaciousness, coherence, and mystery but low levels of texture are the most preferred. For example, the dimensions with the most spaciousness, mountain waterscapes and large bodies of water, are the most preferred. In contrast, the swampy dimension is both the lowest in spaciousness and the least preferred.

Herzog (1985) argues that during the design process of a waterscape, content matters, meaning that people prefer clear, fresh, and moving water such as seen in mountain waterscapes and not in swamps. This implies that, for example, designers should use waterfalls in their projects where possible. Also, the author points out that designers should consider adding a high sense of coherence, complexity, and mystery to waterscapes, but most importantly should add a high sense of spaciousness. As Herzog concludes, “Thus, all other things being equal, the waterscape that provides a long view of itself or is itself at the end of a long view will probably be preferred” (p. 240).

Gabr (2004) interviewed 45 Cairo residents and assessed their preference for different Nile waterfronts via 28 color photographs. From his analysis, eight factors affecting perception of waterfront are derived. “Each factor was interpreted and described in terms of the similarity pattern embedded within the physical features of the scenes or characteristics they seem to

typify. In addition, each factor was labeled to relate to previous research and to communicate with designers and architects" (Gabr, 2004, p. 160).

The first factor, according to Gabr (2004) is content level of raw nature, which is a measure of human impact or activity in a scene, for example, ships or buildings. The second factor is neglect versus care, and this refers to the maintenance level of the shore. For example, shores that are unused with high levels of dirt and broken stone have high levels of negligence. The third factor is manicured harmonious architecture, and this refers to how cleanly the buildings and water are framed. The fourth factor, disharmony, refers to haphazard lines for the river edge. The fifth factor, picturesque and memorable, describes the types of beautiful and idyllic scenes usually associated with postcards. The sixth factor, water related objects, is represented by any objects in or close to the water's edge, such as boats, a crane, or buoys. The seventh factor, water accessibility, is demonstrated by a physical capability to easily reach the shore. Finally, the eighth factor, manicured nature, refers to organized greens along the river's edge that connect the waterfront with nearby streets.

The results of Gabr's (2004) study show that scenes marked as picturesque and memorable are the most preferred. This is because these scenes often marry existing landmarks and elements of value with the natural waterscape to form meaningful views. In addition, scenes that promote manicured or harmonious designs, especially those drawing users easily to the water, are highly preferred. In contrast, the least preferred scenes have apparent neglect and elements that are not well-maintained. In sum, nature content, neglect versus care, manicured architecture, picturesque and memorable images, presence of water-related use, water accessibility, water proximity, and building density are the important factors that drive preferences for waterfronts (Gabr, 2004). Gabr emphasizes that public accessibility to the waterfront is highly important. As he concludes, "The variation in people's responses to scenes of the river edge and their perceptions of various design interventions compel architects and planners to work for maintaining and enhancing the treatment of the river edge" (p. 166).

Faggi et al. (2013) collected questionnaires from 731 people either visiting or living near a waterfront in Buenos Aires. Their purpose was to study human perception of water as a landscape feature, and to investigate whether residents and visitors differed in their appreciation of water due to their socio-cultural backgrounds. In addition, the researchers examined two types of waterfronts, urban and suburban, and evaluated them using a rubric of ten categories: water, emotion, color, maintenance, extension/horizon, animals, wilderness, nature, sounds of nature, and vegetation. Finally, the responses were grouped by gender, visitors to urban versus suburban waterfronts, and residents living near urban versus suburban waterfronts.

According to Faggi et al. (2013), visitors value water more than any other feature, followed by vegetation, emotion, and color. Residents value color more than any other feature, followed by water, nature, and vegetation. In addition, gender does not have a significant influence on preference. Finally, urban waterfronts are more preferred than suburban ones by both visitors and residents. The authors offer three explanations for water preference in their study: scarcity, mystery, and familiarity. For example, in urban locations where water is perceived to be scarce, people want to have more water feature such as ponds, fountains, and artificial cascades. Furthermore, the authors pointed out a feeling of pleasant surprise that may accompany finding waterfronts in urban locations. Finally, suburban residents, especially those around coastal areas, often perceive water with a feeling of familiarity as they are used to fishing, rowing, boating, and other activities prevalent in natural coastal landscapes.

Table 2-4 Perceptions of Design Elements and Features

Herzog, 1985	Gabr, 2002	Faggi, et al., 2013
Waterscape preference, predictor variables	Riverfront, urban waterfront aesthetics, visual preferences	Water preferences, residents
function of waterscape category	Dimensions affecting perception of waterfront design interventions	Landscape features
Coherence	Content level of raw nature	Animals
Complexity	Disharmony	Color
Identifiability	Manicured harmonious architecture	Emotion
Mystery	Manicured nature	Extension/horizon
Spaciousness	Neglect vs. care.	Maintenance
Texture	Picturesque and memorable	Nature
	Water accessibility	Sounds of nature
	Water-related objects	Water
		Wilderness
		Vegetation

2.4.2 Perceptions of Water Characteristics

In the book, Litton et al. (1974) argue that space, represented as the uniform amount of area a water body covers in totality, is one of water's most distinctive and therefore most readily perceived characteristic. However, they point out that many people prefer water bodies whose total size is not immediately clear, for example, water bodies with projecting points that only reveal themselves as the observer moves through the scene. In fact, according to the authors, "It has been traditional in Japanese landscape design to conceal some part of a water body so it is never wholly visible from any one viewing place" (p. 79). In addition, they suggest that people perceive the movement of water as its most exciting quality. Furthermore, according to Litton et al., water clarity is directly related with perceived beauty, meaning that the more clear the water is, the more beautiful it will be rated. However, the authors do note that although water color is an easily recognizable characteristic, due to the numerous conditions that create color, it is problematic to rate water on the basis of color alone.

According to Yamashita (2002), there are four characteristics that describe water: flow rate, surface conditions, quality, and usage. Yamashita had adults and children take pictures of and verbally describe river environments. These participants discussed flow rate using words such as flow, fast, slow, gentle, amount, depth, level, falling, and gushing. They described water surface conditions using expressions such as water surface, reflection, and expression. In addition, the words pure, cold, clean, impure, water quality, and wastewater were used to describe water quality. Finally, the usage of water was explained with expressions such as rice fields, farming, extinguishing fires, park maintenance, washing, and domestic use.

According to Yamashita (2001), when analyzing the pictures taken, whereas adults pay more attention to flow rate and surface conditions, children are more attracted to water quality. In addition, both adults and children are relatively uninterested in water usage. However, when investigating the described characteristics of water, quality is most important and most frequently referred to by both adults and children. Finally, according to the results of this study, adults evaluate a waterscape primarily by its various characteristics and children evaluate a waterscape mostly in terms of the quality of the water. Yamashita concludes that designers should consider the dynamic aspects of water if the dominant viewer is an adult, and focus on the quality of water if the scene is to be enjoyed by children.

Table 2-5 Perceptions of Water Characteristics

Litton, Tetlow, Sorensen and Beatty, 1974	Yamashita, 2001
Role of water in landscape, nature and urban	Perceptions of water
Measurements	Measurements
Space	Flow rate
Size	Water surface
Water clarity	Water quality
Water color	Usage of water

2.5 Example Waterfront Projects

This section discusses three successful waterfront projects in America as described by Butler (2001). Butler identified a set of criteria to measure and compare different American waterfronts: access, landscaping/ vegetation, variety of land uses, activities, unique architectural accents, feeling of safety, located near central business district, shops, eateries, size, and lighting. According to the author, the more of the criteria that are present in a waterfront development, the more successful that development is.

2.5.1 Chicago Riverwalk

The study of the Chicago Riverwalk is important to the study of the waterfront landscapes in the Las Colinas Urban Center because the Chicago Riverwalk is a waterfront surrounded by substantial residential development and open space, and both are well connected for the benefit of visitors and residents. Likewise, the waterfronts in the Las Colinas Urban Center are in close proximity to both mixed use and open spaces. Therefore, understanding the criteria for success of the Chicago Riverwalk and identifying them as well in the Las Colinas Urban Center will help provide improved recommendations for future design.

"The Chicago Riverwalk is a scenic waterfront attraction that enhances the vitality of downtown Chicago" (Butler, 2001, p. 8). In 1887, the Chicago Sanitary and Ship Canal was built by engineers to reverse the flow of the Chicago River from eastward to westward. The plan was for human and industrial waste to be carried away through the 28 mile canal from the tip of the south branch of the Chicago River to the Mississippi River. The 1909 Plan of Chicago proposed to redevelop the waterfront area by creating more public park and playground areas. From these developments, the Chicago Riverwalk was created, which winds through the city and features a variety of cultural and recreational activities.

Chicago River has three main parts, the North, Main, and South branches (Butler, 2001). Along the North branch, many recreational areas have been built along the river,

providing a setting for canoe-launching sites, picnic areas, a toboggan slide, hiking trails, and golf courses. The central business district is along the Main branch of the river and has areas for walking, dining, art and shopping. In addition, there is a mixture of buildings and land uses along the river. As Butler (2001) says, “Residential land use allows people to have constant access to the Riverwalk and gives a sense of life to it” (p. 9). According to Butler, as of 2001, the City of Chicago was working on extending the Main branch possibly to Lake Michigan, hoping to improve access and attract more people from other places in the city to visit the riverfront. Finally, while the South branch consists mainly of industrial buildings, two parks, Chinatown Park and Origins Park, have been built along this area to improve access to the River.

According to Butler (2001), many of the criteria for a successful waterfront are met by the Chicago Riverwalk. For example, there are a variety of activities for people to do along the River, such as playing in fountains or riding in gondolas along the Main branch. In addition, this waterfront fulfills the important criteria of easy access by pedestrians through bridges across the river and open space around the buildings. The many apartments and lofts attract residents to this area. The feeling of safety is enhanced by the articulated paving and abundant lighting. Finally, the entire Riverwalk has unique architectural accents such as the Gateway, the tall hotel buildings, and the open parks.

2.5.2 New Orleans Riverwalk

The New Orleans Riverwalk has created many job opportunities and brought in much tourism (Butler, 2001). Understanding the criteria for success for the Riverwalk of New Orleans will help better understand how to design an attractive waterfront that may lead to increased tourism and a booming economy for the Las Colinas Urban Center.

New Orleans is intimately connected with the Mississippi River, and a system of levees and pumps keeps the city from being flooded as some parts of it are up to five feet below sea level (Butler, 2001). Due to its location on the river and close to the Gulf, New Orleans has been

a center of transportation and banking, and has attracted an often transient population of traders, immigrants, and tourists. In 1986, the New Orleans Riverwalk was finalized and is comprised of four sections: the Spanish Plaza, the Lower/Poydras Street Wharf, the Upper/Poydras Street Wharf, and the Julia Street Wharf.

The New Orleans Riverwalk is successful because it has revitalized the waterfront by creating jobs and increasing tourism (Butler, 2001). According to Butler, the Riverwalk has over 140 stores and 179,000 square feet of retail space. In addition, over 9 million people visit New Orleans every year, and due to its easy access and numerous festive activities, most of them patronize the Riverwalk. Butler concludes that New Orleans's Riverwalk satisfies many of the criteria for a successful waterfront. For example, it has a lively and diverse atmosphere. It is located in the center of the city and has unique large-scale amenities such as the New Orleans Aquarium and the Riverwalk Mall, which attract numerous people to it.

2.5.3 San Antonio: Paseo Del Rio Riverwalk Development

Understanding this project is important to the study of the Las Colinas Urban Center's waterfronts because the San Antonio Riverwalk attracts numerous visitors every year mostly because of the ways in which the retail and the waterscapes are connected (Butler, 2001). For example, there are numerous pedestrian bridges that can be used to easily access both sides of the Riverwalk in San Antonio. However, the businesses on both sides of the Mandalay Canal are dying, possibly due to poor accessibility. Therefore, the study of the San Antonio Riverwalk will help researchers provide better recommendations for the future improvement of the retail around the canal and the lake of the Las Colinas Urban Center.

According to Butler (2001), the San Antonio Riverwalk, originally known as the Paseo Del Rio, was as bad as a sewer prior to becoming one of the most successful urban redevelopments of a waterfront in modern history. Before the 1920, the river was toured as a jungle cruise, and in 1921, flooding from the river damaged the downtown. Therefore, in order to make the city more beautiful and address the flooding concerns from its citizens, the city began

to construct dams in 1925 (Butler). The city also decided to develop the river banks into city parks. The first dam was completed in 1926 and overflow channels were created to deal with the flooding. In addition, according to Butler, fountains, multi-colored lights, and sidewalks were added along the river to beautify its banks. Different types of vegetation were planted around the river and a flagstone walk was built along the shore. Finally, bridges with better lighter were installed and the water was cleaned of trash.

Butler (2001) states that the development was completed in 1941 and was "20 feet below street level and has 17000 feet of new riverwalk and sidewalk, 11,000 cubic yards of masonry, 31 stairways, and three dams. Walkways had trickling water from the walls for a natural effect. Also there existed 4000 plants and shrubbery with 75 species of trees" (p. 36). After the World's Fair in 1968, the city allowed commercial development along the Riverwalk, and it gradually became the center of downtown San Antonio. It features various shops and restaurants, provides both indoor and outdoor experiences, and has increased security. As the Riverwalk has numerous festivals and offers a variety of activities, it draws in visitors with its diverse culture of sights, sounds, smells, and colors (Butler, 2001).

According to Butler (2001), all of the criteria for a successful waterfront are met by the Riverwalk of San Antonio. It is easily accessed from all points of city. The bridges, tall trees, and vlowers add texture to the Riverwalk, and the various shops and activities present keep it alive and interesting. The Riverwalk is always well lit, providing for a strong feeling of safety. Finally, as Butler points out, "Eateries and shops are present all along the riverwalk, along with some residential uses, which is a key criterion to allowing people to use the site and visit repeatedly" (p. 42).

2.6 Las Colinas Urban Center, Irving, Texas

According to the Las Colinas Association (2007), in 1928 John W Carpenter purchased a few hundred acres of land that later became Las Colinas. Originally called Hackberry Creek, John's wife renamed the place *El Ranchito de las Colinas,* which means the little ranch in the

hills. The Carpenters started buying more land in 1952, and by 1959, they owned over 6,000 acres. John Carpenter died of a heart attack that same year, and his son, Ben Carpenter, working for the Crockett Company, started developing the land as the City of Irving was trying to annex it. Finally, according to the Las Colinas Association (2007), in 1964, the Las Colinas Country Club opened, and in 1972, Ben officially unveiled the master plan for Las Colinas, including Las Colinas Urban Center, even though it was far from complete (Figure 2-1) (Las Colinas Association, 2007).

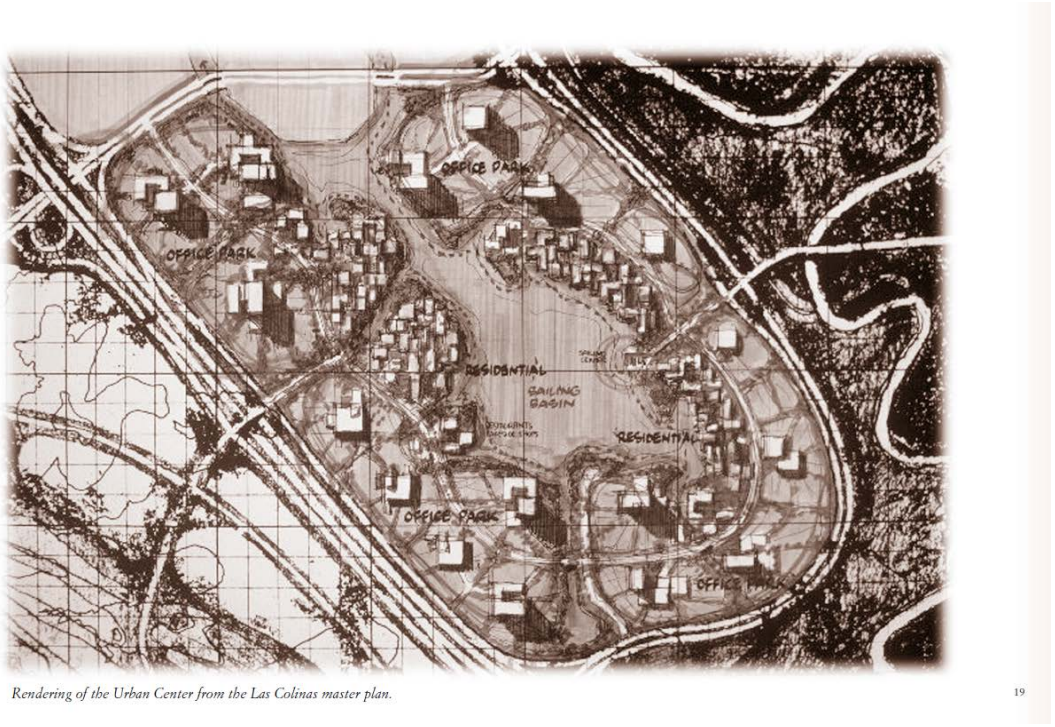


Figure 2-2 Rendering of the Urban Center from the Las Colinas Master Plan (Source: The Las Colinas Association, 2007)

The Urban Center was designed on 960 acres between John W. Carpenter Freeway and Walnut Hill Lane (Las Colinas Association, 2007). However, the proposed land was on a floodplain of the Trinity River, and to be reclaimed, levees needed to be built. Unfortunately, doing so would make Class A development impossible, so Ben decided to create a 125 acre

lake, Lake Carolyn, and gradually grade the massive amount of excavated dirt into a gently sloping, mostly unnoticeable levee 437 feet above sea level (Figure 2-2). The plan called for preserving the natural beauty of the land while increasing the Urban Center's value. In addition, according to the Las Colinas Association, canals were built along the natural creeks in the area to siphon storm water runoff into Lake Carolyn and eventually the Trinity River. During this process, Ben Carpenter focused on creating a municipal utility district to maintain Lake Carolyn, and a strong property owners association to ensure the plans success (Las Colinas Association, 2007).

Lake Carolyn during the initial phase of excavation.

Figure 2-3 Lake Carolyn during the Initial Phase of Excavation (Source: The Las Colinas Association, 2007)

Figure 2-4 The Mustangs of Las Colinas

While Las Colinas was growing, a 1.4 million square foot office complex was created in the heart of the Urban Center and became known as Williams Square (Las Colinas Association, 2007). Williams Square developed around a bronze sculpture of nine horses galloping through water, The Mustangs of Las Colinas (Figure 2-3). This sculpture, which has become an icon of the Center's development, took over seven years to complete and was finally ready in 1984. The rest of Williams Square opened in 1985.

According to the Rail Station Area Fact Sheets (2015), the total population of the Las Colinas Urban Center is 12,632 and the population density is 868/square mile. The median age

of the Urban Center is 34.8, and the median income is 77,424 dollars. 7,881 housing units are there, and 88.7% of them are occupied.

Nowadays, the Las Colinas Urban Center is easily accessed by three multi-lane freeways, and in 2012 it was connected to the Dallas Area Rapid Transit (DART) system (Figure 2-5). Along the DART's path in the Urban Center, several large-scale development projects are being planned that promise to revitalize the area (Las Colinas Association, 2007). In addition, as can be seen on the Development Map around Lake Carolyn (Figure 2-6a), numerous other projects around the Urban Center (District 5) have been proposed or issued, many along the waterfront. For example, according to the Las Colinas Association (2007) Water Street is a planned development by Urban Partners and Gables Residential for apartments, condominiums, shops, restaurants, and offices along the Lake Carolyn waterfront (Figure 2-6b). Clearly, waterfront development in the Las Colinas Urban Center is one of the major elements that attracts potential residents. Therefore, the Las Colinas Urban Center, Irving, Texas is a valuable study area for this research as it will provide valuable recommendations for future waterfront development.

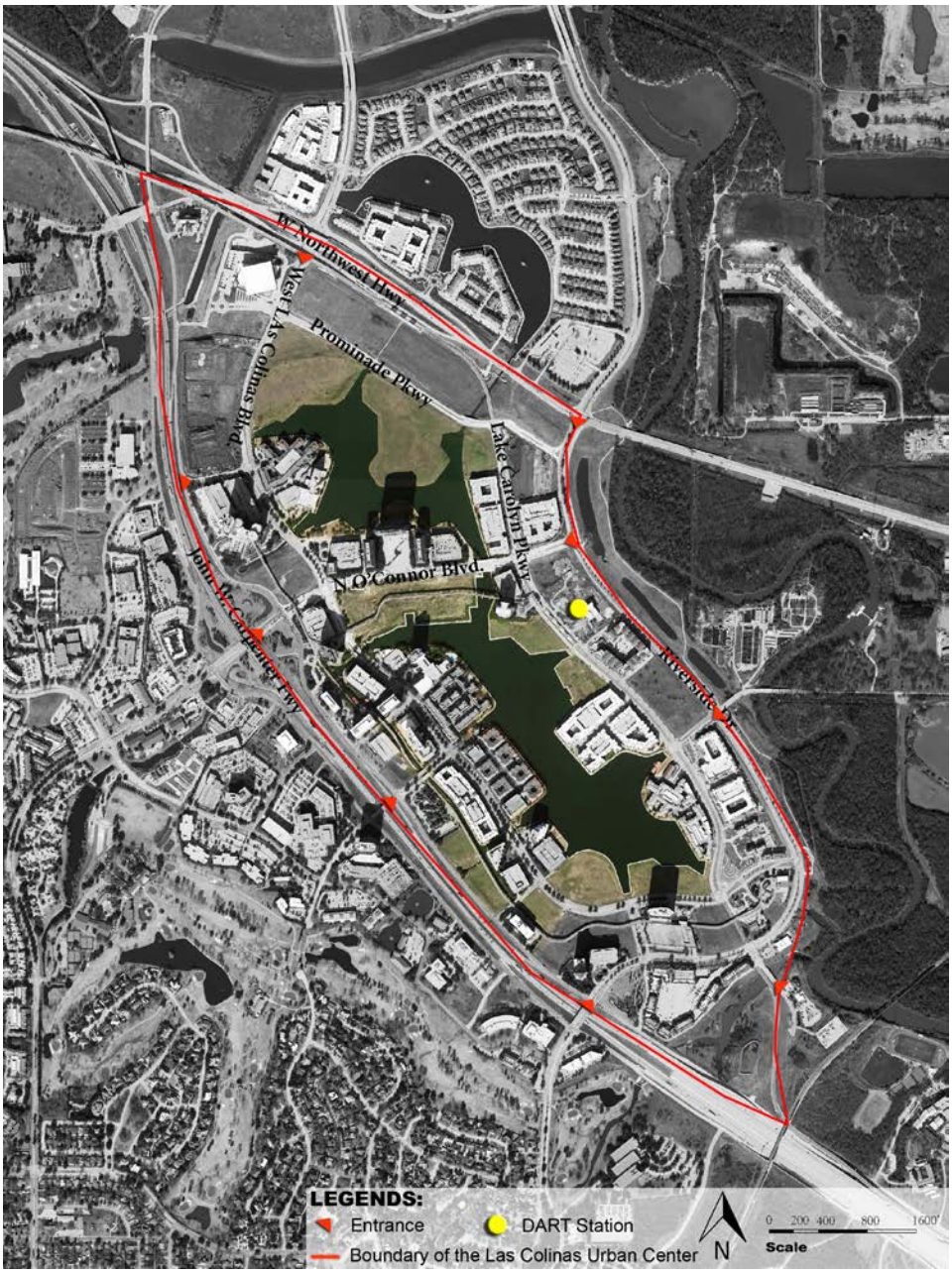


Figure 2-5 Areal Map of the Urban Center in Las Colinas 2015

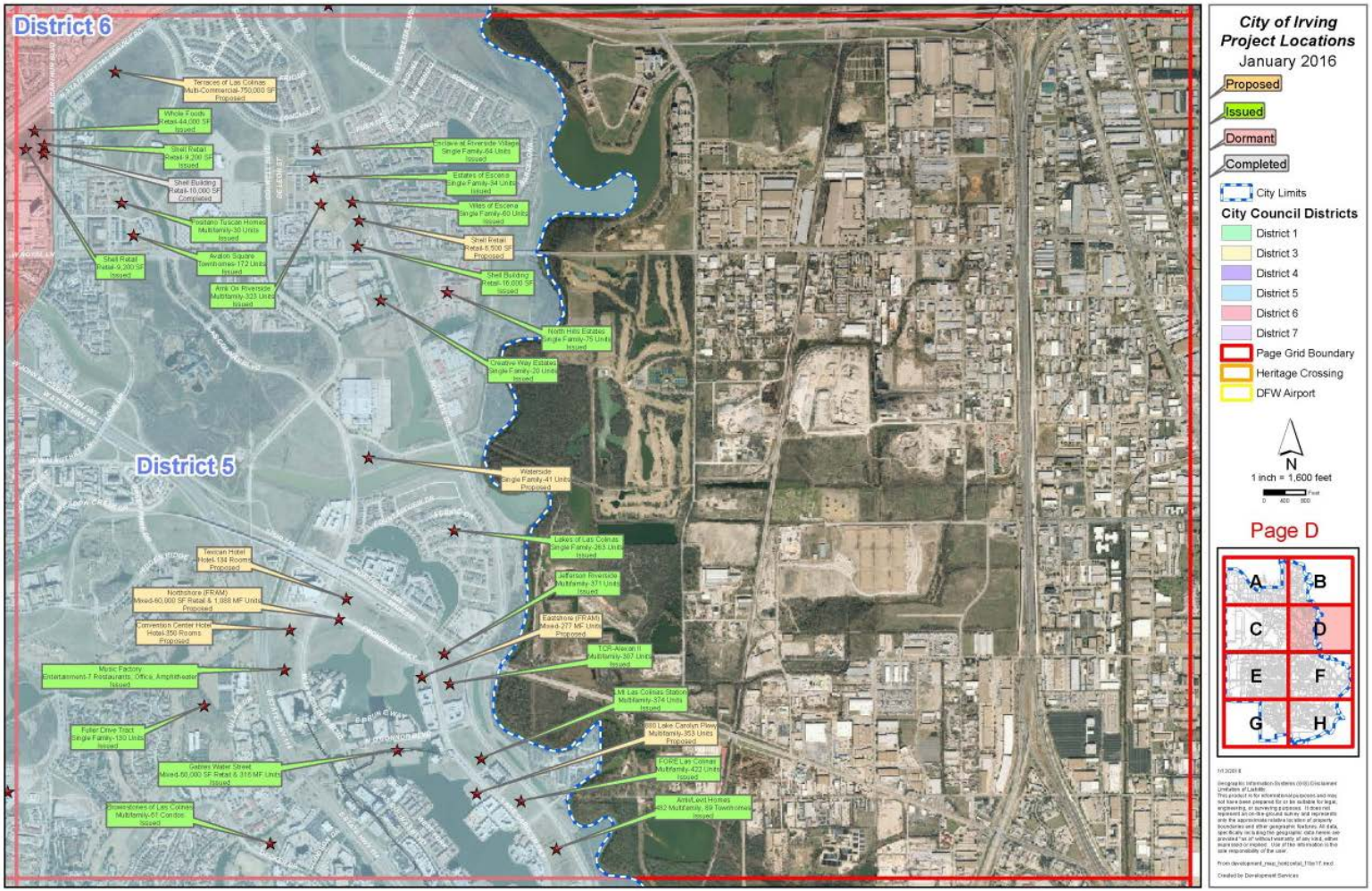


Figure 2-6a Development Map around Lake Carolyn (Source: Website of the Government of Irving Texas, 2016)

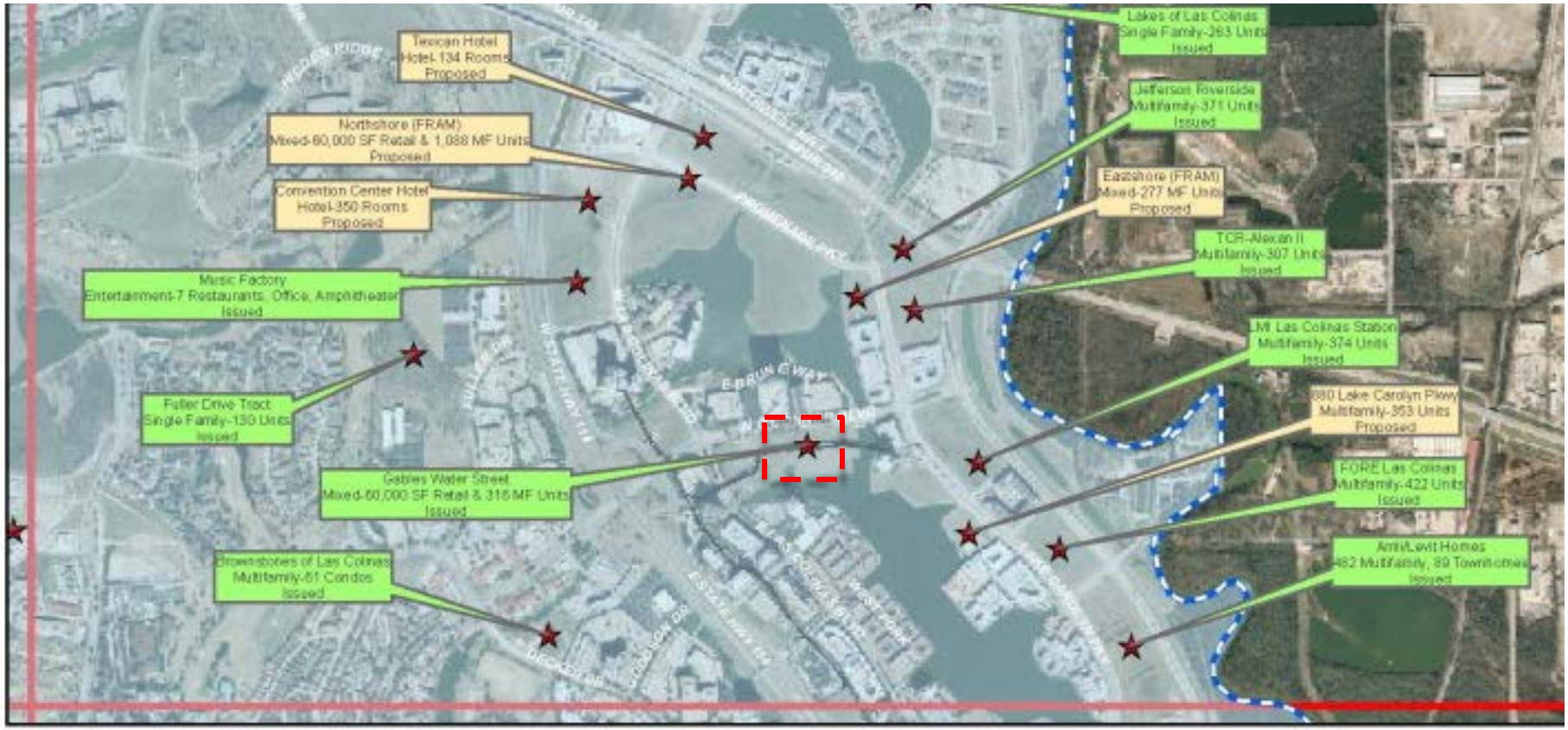


Figure 2-6b Development Map near Water Street Project (Source: Website of the Government of Irving Texas, 2016)

2.7 Summary

This chapter defines waterfront landscapes and discusses them in terms of their elements, features, and characteristics. In addition, this chapter explores human perception of waterfront landscapes. Finally, the study site, the Las Colinas Urban Center in Irving, Texas, is detailed, and information about its history, location, and upcoming developments is provided. This literature review creates a foundation upon which the data collected in this thesis can be framed, evaluated, and reported. The next chapter details the methodology used to collect and analyze the data in this research.

CHAPTER 3

RESEARCH METHODS

3.1 Introduction

This chapter discusses the methods used in this study. Qualitative methods are used in this research to understand the residents' perceptions of the waterfront landscapes in Las Colinas Urban Center, Irving, Texas. In addition, they are used to determine what landscape design characteristics of the waterfront landscapes affect people's perceptions. This chapter contains the research design, research methods, data collection methods, data analysis procedures, bias and errors, and summary of the chapter.

3.2 Research Design

This research uses qualitative research methods, which include passive observations, in-depth interviews with residents, and secondary data from the literature review. The first step in this study is to collect two types of secondary data: (1) data about waterfront landscape design characteristics from the literature review, and (2) data about the selected site from existing internet and published documents.

The second step is to obtain approval from the Institutional Review Board (IRB) (see Appendix A). This is for the protection of the respondents. After the approval of IRB, the interviews are conducted at the Las Colinas Urban Center during the daytime. The respondents are chosen at random and are directly interviewed. The purpose of the interviews is to better understand the residents' perceptions of waterfront landscapes in Las Colinas Urban Center. The interviews are conducted according to IRB standard. Each interview lasts about twenty-five minutes.

The third step is to do passive observations on site. The observations are conducted during the daytime to observe the landscape design characteristics of the waterfront landscapes

within the site. These data are used to highlight the elements and features, water characteristics, and accessibility at the Las Colinas Urban Center.

The final step is to compare the findings from the in-depth interviews and passive observations to the information gathered from the literature review. This will help better understand the residents' perceptions of waterfront landscape design characteristics and respond to the four research questions that guide this research.

3.2.1. Study Population

This study focuses on the perceptions of the residents of the Las Colinas Urban Center in Irving, Texas as opposed to other populations such as employees, visitors, and/or business owners. Numerous residential developments have been constructed in the Las Colinas Urban Center within the past couple of decades. According to the news and government documents, more residential projects are going to be constructed in the coming years. Therefore, more potential residents will most likely move into this area. Also, compared with other users, residents who live in or near the Las Colinas Urban Center generally have more opportunity and various reasons to enjoy the waterfront landscapes at any time of day or night. Therefore, in this study, residents living in or near Las Colinas Urban Center are the only participants.

The residents in this research are chosen from a random sampling of different waterfront areas of the Las Colinas Urban Center to have a diversity of experiences, perceptions, and responses. The snowball sampling technique is used for those residents accessed via e-mail or third party references. The snowball sampling is a technique used to identify future informants based on the existing informants' responses (Castillo, 2009). All the interviews are recorded electronically with the permission of the informants. The electronic data are deleted after they have been transcribed.

3.2.2 Site Selection

In this study, a site with a man-made waterfront environment is selected to help this researcher understand the residents' perceptions of waterfront landscape design characteristics. There are several requirements for the selected site:

1. It should have waterfront landscapes;
2. It should have a man-made waterfront environment;
3. It should contain residential development.

Compelling factors in the site selection are the presence of man-made fresh water bodies such as canals, lakes, ponds, wetlands, and even pools and fountains. Therefore, the site of this research is Las Colinas Urban Center, Irving, Texas.

3.2.3 Data Collection Methods

3.2.4 Data Analysis Procedures

According to Taylor and Bogdan (1998, p.137), instead of approaching data from assumptions, other research, or existing theoretical frameworks, it is better to pull the discovered theories, concepts, hypotheses, and propositions directly from data. This research uses the methods that benefit from the grounded theory approach (Taylor and Bogdan, 1984).

In order to better classify the data into sub-categories, the interview data are categorized by key words (Sommer, 1991). In addition, the secondary data from the literature review and passive observations are compared with the interview data to explore relationships between the data sets. Finally, these relationships are summarized and integrated into a conclusion (Taylor and Bogdan, 1998). Figure 3-1 depicts this process of analyzing data.

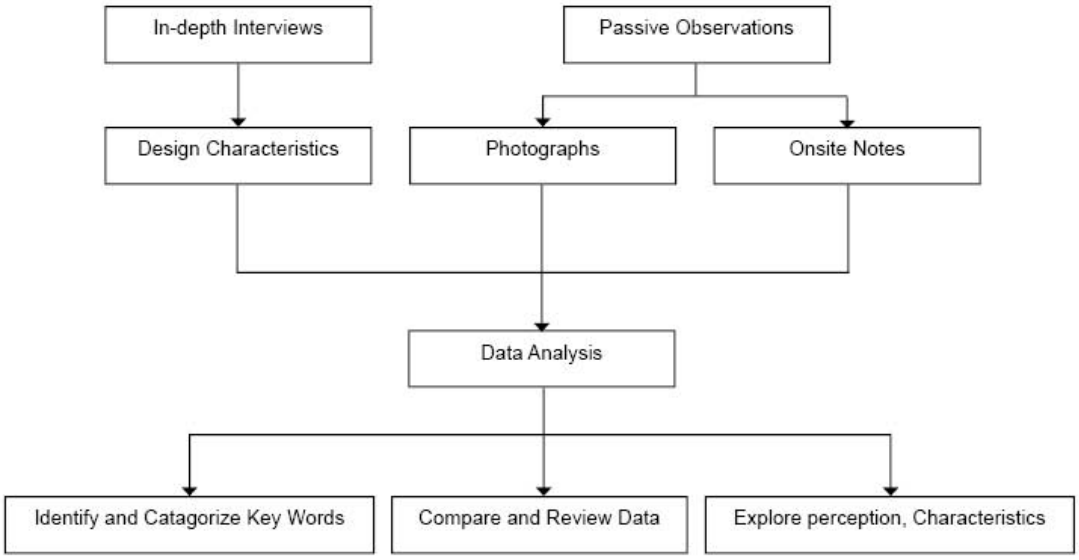


Figure 3-1 Data Analysis Process

3.3 Bias and Error

There are various data collection methods used in this research; in-depth interviews, passive observations, and secondary data from the literature review as well as analysis methods are used to better understand the residents' perceptions of the waterfront landscapes of the Las Colinas Urban Center. It is anticipated that this research design as well as the study population and location selection are prone to errors and research biases. Some of the major anticipated errors and biases are as follows:

One limitation concerns the discrepancy between what people say and their real attitudes or thoughts. People may provide answers that are vanilla washed or that they expect the researcher to want to hear. That is, the interviews have the limitations based on differences between the informants' words and actions.

Another limitation is the onsite observations are taken only during the daytime. Residents' activities before or after the observation time may be different from the activities observed.

In addition, because of the lack of time for the research, not all of the residents who live in the Las Colinas Urban Center are interviewed.

All of the interviews are conducted at the Las Colinas Urban Center in Irving, Texas. Therefore, the results from this research may not be applicable for other sites.

This researcher has inherent choices, values, and preferences; therefore, biases may exist regarding the site selection and analysis due to her professional experience.

Finally, because the observations and interviews are only taken during the spring of 2016, the data may not be representative of an entire year. For example, residents may participate in different activities and may experience different perceptions in the spring versus in the winter or spring.

3.4 Summary

This chapter discusses the research methods and research design used in this study. In-depth interviews are used to understand residents' perceptions of waterfront landscapes and to explore suggestions about how to improve waterfront landscapes. Secondary data from the literature review and passive observations are used to identify and analyze the characteristics of the waterfront landscapes in the Urban Center of Las Colinas, Texas. Through analyzing and synthesizing the secondary and interview data, the research questions that guide this study will be answered.

CHAPTER 4

ANALYSIS AND FINDINGS

4.1 Introduction

This chapter describes the findings from the interviews and passive observations. The interview data are analyzed and classified into key words from which themes emerge. The observation data are categorized into three dimensions: elements and features, water characteristics, and accessibility. An overview of the findings is provided at the end of this chapter, followed by a summary.

4.2 Analysis of the Interview Data

The in-depth interview of this study is used to understand residents' demographic profile (e.g., age, gender) and their perceptions about the waterfront landscapes in the Las Colinas Urban Center, Irving, Texas. The transcriptions of the interview are analyzed by the researcher to identify the participants' perceptions of the elements and features, water characteristics, and accessibility of the waterfront landscapes, and to gather any suggestions the interviewees might have about how to improve them. In addition, the results of the interview will be classified into key words, and from these key words themes will be identified for analyzing and discussing the results and conclusions of this research.

4.2.1 Participants' Demographic Profiles

Four questions are asked to gather data about the demographic profiles of the participants of this research. The purpose of these questions is to help determine if their gender or age group influenced their decisions to live near the waterfront. In addition, the participants are asked whether they have children or pets because children and most pets need outdoor activity, which may be another determining factor explaining why the participants chose to live near the waterfront of the Las Colinas Urban Center, Irving, Texas.

- What is your gender?
- What is your age group? (Feel free to indicate your age or indicate you are Young Adult, Adult, or Senior, etc.)
- Do you have minor/kid(s) in your household requiring parental supervision?
- Do you have pet(s) requiring outdoor activity?

Nineteen (I1-I19) residents of the Las Colinas Urban Center participated in this research by responding to the interview questions. According to Table 4-1, 53% of the participants are male and 47% are female. In addition, nearly 95% of the participants are either young adults or adults, with 53% of the participants being young adults and 42% being adults. In fact, only one senior participated in the interview. About a quarter of the participants report having minor kids who require parental supervision in their household, and nearly half (47%) of the participants report having pets that need outdoor activity.

Table 4-1 Demographic Profiles

Informant No.	Gender	Age Group	Minor/Kids	Pets
Informant 1	Female	20	Yes	Yes
Informant 2	Female	21	No	No
Informant 3	Male & Female	Young Adults	Yes	No
Informant 4	Female	Adult	No	Yes
Informant 5	Male	Adult	No	No
Informant 6	Female	Young Adult	Yes	No
Informant 7	Male	21	No	Yes
Informant 8	Male	Adult	No	No
Informant 9	Female	Adult	No	Yes
Informant 10	Male	Young Adult	No	Yes
Informant 11	Female	31	No	Yes

Informant 12	Male	31	No	No
Informant 13	Male	42	No	No
Informant 14	Female & Male	26 & 28	Yes	Yes
Informant 15	Male	Adult	Yes	No
Informant 16	Female	Adult	No	Yes
Informant 17	Male	Senior	No	No
Informant 18	Male	Adult	No	No
Informant 19	Female	Young Adult	No	Yes

4.2.2 Participants' Residence Profiles

Seven questions are asked to gather information about where the participants live. All of the participants are expected to be residents who live near the waterfront landscapes in the Las Colinas Urban Center and who visit the area weekly. Thus, these questions also collect information about how often the participants visit the waterfront, and how the presence of water may have influenced their decision to live in the Las Colinas Urban Center.

- Are you a resident living in Las Colinas Urban Center, Texas? (Las Colinas Urban Center is depicted in the map which surrounded by W Northwest highway, John W. Carpenter freeway, and the riverfront drive)
- How long have you been living within this waterfront community?
- Have you ever lived in waterfront community before Las Colinas, Texas? If so how long have you lived there?
- Did the availability of waterfront landscapes influence your decision to live in Las Colinas Urban Center, Texas?
- How far is your residence to the nearest waterfront in Las Colinas Urban Center, Texas? (i.e. walking distance ¼ mile, couple blocks etc.)
- Do you have visual access to water from your residence?

- How often do you visit waterfront in Las Colinas Urban Center, Texas? (Daily, Weekly, Monthly, Several times in a week, One time, and etc.)

Table 4-2 Residence Profiles

Informant No.	Resident	Years lived	Lived before	Years lived	Waterfront Influence the decision	Distance	Visual Access	Frequency
Informant 1	No	3	Yes	3	Yes	2 miles	No	Several/w
Informant 2	No	2.5	No	0	Yes	2 miles	No	1,2/w
Informant 3	Yes	Several	Yes	4	Yes	10 feet	Yes	Daily
Informant 4	Yes	5	Yes	10	Yes	Besides	Yes	Weekend
Informant 5	No	Several	Yes	2	Yes	10 mins drive	No	3/w
Informant 6	Yes	0.8	No	0	Yes	Besides	No	Daily
Informant 7	Yes	A Week	No	0	Yes	Besides	Yes	Daily
Informant 8	Yes	Less than a year	Yes	Several	Yes	10 feet	No	Daily
Informant 9	Yes	1	No	0	Yes	Besides	No	Daily
Informant 10	Yes	0.5	No	0	Yes	Half mile	Yes	4,5/w
Informant 11	Yes	1.5	No	0	Yes	Besides	Yes	Daily
Informant 12	Yes	1	No	0	Yes	5 feet	Yes	3/w
Informant 13	No	1	Yes	10	Yes	2 miles	No	Several/w
Informant 14	Yes	3	No	0	Yes	Besides	Yes	Daily

Informant 15	Yes	0.2	No	0	Yes	10 yards	No	Daily
Informant 16	Yes	0.7	Yes	2	Yes	Besides	Yes	Daily
Informant 17	Yes	0.6	Yes	2	Yes	100 yards	No	Daily
Informant 18	Yes	3	No	0	Yes	Besides	Yes	Daily
Informant 19	Yes	2	No	0	No	100 feet	Yes	Daily

According to Table 4-2, 21% of the participants do not live in the Las Colinas Urban Center but live within a five mile radius and visit the waterfront at least twice a week. Although these participants are not actual residents of the Urban Center, they are considered as such for the purposes of this research. All of the participants have been living in or around the Las Colinas Urban Center for less than six years. However, 42% of the participants report having lived in waterfront communities prior to living at or near the Las Colinas Urban Center, and two of these participants have lived near a waterfront community for at least ten years. All of the participants but one (95%) report that the availability of the waterfront influenced their decisions to live at or near the Las Colinas Urban Center. Finally, all of the informants report that they visit the waterfront at least twice a week, and more than half (63%) report that they visit the waterfront daily.

4.2.3 Participants' Perceptions of Elements and Features

Four interview questions in this research concern the participants' perceptions of the elements and features of the waterfront landscapes in the Las Colinas Urban Center. The participants are asked to discuss which elements and features they most and least prefer, and which areas of the waterfront landscapes they most and least prefer. Even though features in this thesis refers to developed and undeveloped areas, the participants are also asked which areas they most and least prefer because some respondents may misunderstand or confuse the difference between elements and features, or misunderstand that features refers to a systematic combination of elements. In addition, the participants are asked why they do or do not prefer these elements, features, and areas.

- What are your most favorite landscape elements and features in waterfront landscapes in Las Colinas Urban Center? Why? (Elements and features may refer to seating, greenery, lighting, bridges, overhead structures, sculptures, bridges, maintenance, trees, and etc.).

- What are your least favorite landscape elements and features in waterfront landscapes in Las Colinas Urban Center? Why? (Elements and features may refer to seating, greenery, lighting, bridges, overhead structures, sculptures, bridges, maintenance, trees, and etc.).
- What is your most favorite area in waterfront landscapes in Las Colinas Urban Center? Why? (Feel free to also illustrate the areas on the map. Please feel free to indicate more than one area).
- What is your least favorite area in waterfront landscapes in Las Colinas Urban Center, Texas? Why? (Feel free to also illustrate the areas on the map. Please feel free to indicate more than one area).

According to the data from the interviews, the nineteen participants report eight elements and features as being most preferred. As shown in Figure 4-1, Lake Carolyn is most preferred by 58% of the respondents; the trail or pathway is most preferred by 32%; the buildings by 21%; the vegetation by 16%; and the sitting area and benches, lights, trains, and canal each by 5%.

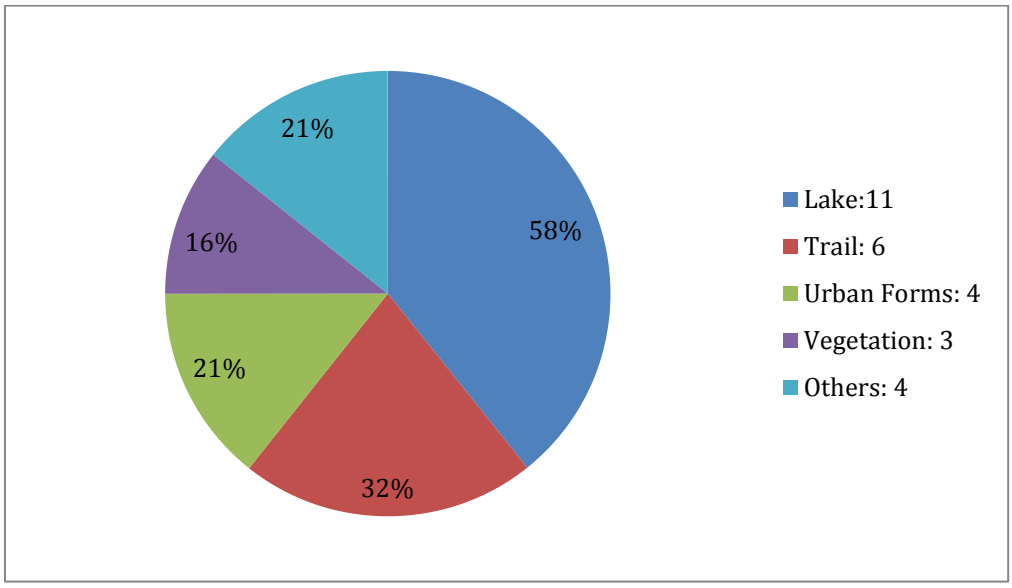


Figure 4-1 Most Favorite Elements and Features

1. Lake Carolyn

Eleven informants report that the lake is their favorite feature of the waterfront landscapes at the Las Colinas Urban Center. According to the Faggi (2013), people often prefer lakes because of the sense of familiarity they evoke. In this study, four of the participants (I-3, I-13, I-2, & I-17) who say that the lake is their most preferred feature were born and/or raised near the ocean. According to them, they love the sea, and even though Lake Carolyn is man-made, they still enjoy it considerably as it reminds them of the ocean. In fact, I-17 says, “It’s part of my nature.”

Other reasons given for most preferring Lake Carolyn are that it is peaceful, calm, relaxing, beautiful, and that it has a nice view. For example, according to I-2, “It’s really calming and I think I especially like it when I work out.” In addition, I-13 says that “I just like the lake. It’s beautiful. It’s clean. It’s peaceful. It’s quite.”

Finally, two informants (I-1 & I-4) most prefer the lake in combination with other elements. According to I-1, the lake in combination with the vegetation is what she most prefers about the waterfront landscapes. As she says, “This, I mean, just the fact that you get to have some green with the water I think the combination of both natural parts in front of your house. It’s very therapeutic.”

2. The trail or pathway

Six of the nineteen informants say that the trail or pathway is their most preferred feature of the waterfront landscapes at the Las Colinas Urban Center. Four of these informants report that they enjoy the view along the trail, one informant likes the trail for exercise, and one says he likes the trial the most but offered no reason. Finally, another informant (I-4) says she likes “the underground walkways under the bridges. You know especially the underneath where the canal is even coming from this side of the lake to the other side of the lake. If you go under the bridge, it’s a nice little walk way.”

For all the informants, different people prefer different sections of the trail (see Figure 4-2). Many of the participants enjoy the area on the trail where they could see the entire lake. Four of

the informants say this is the location they prefer the most is because they could enjoy the beautiful view from there. For example, according to informant (I-4), “So for right here you can get a very good view to the Williams Square from the back. This is really pretty.” In addition, informant (I-9) reports that the waterfront landscapes make her feel relaxed, calm, and peaceful: “It’s very calm. You can do a little track trail instead of the main one.”

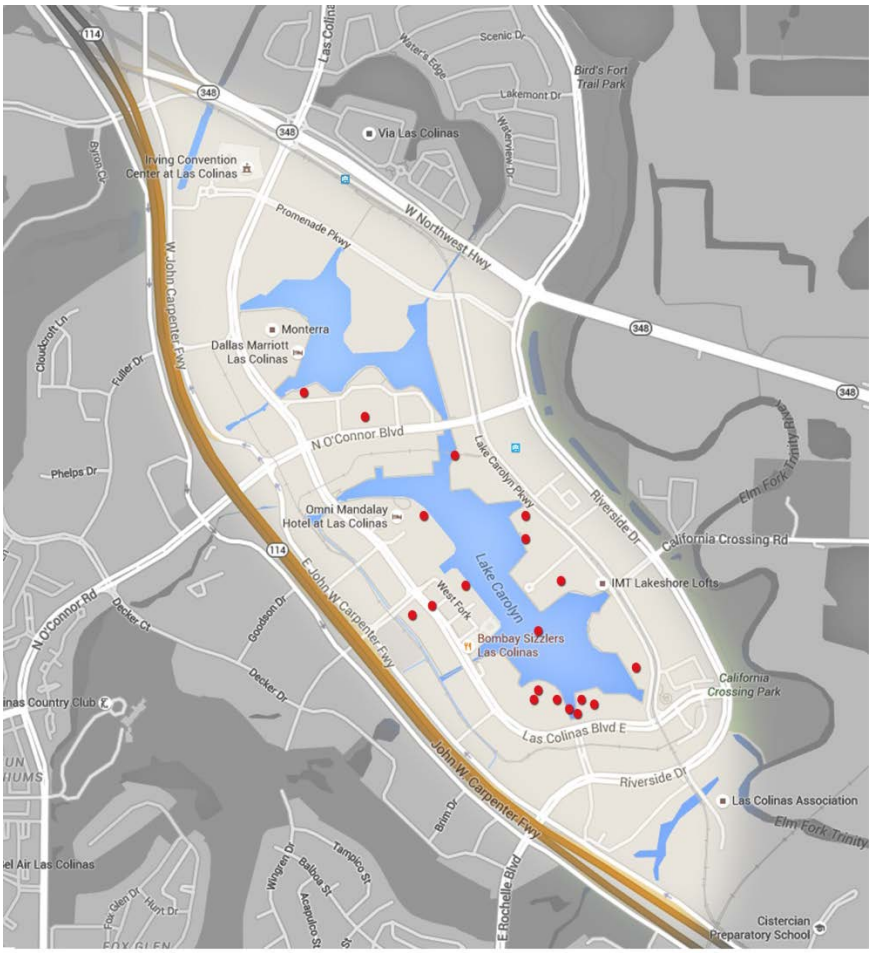


Figure 4-2 Most Favorite Features

2. Urban Form

Urban form are the third most mentioned feature during the interview process. The word “urban forms” in the interview responses typically refers to the feeling of the city life or the urban

setting. Furthermore, the phrase “urban form” in this thesis typically is used in conjunction with other elements, such as lights, trees, and the pathway, so as to be representative of what are considered urban forms. Indeed, some of the participants report that they not only prefer the life in the city, but also they want to enjoy the nature view. Therefore, they chose to live at the Las Colinas Urban Center. For example, according to informant (I-4), “I like the city area with the waterfront. I like the city and water together.” Another informant (I-16) points out that “I love the city because of the lights and stuff, but being near the water is more soothing for me and it’s more attractive, calm, peaceful rather than being in that city environment.”

3. Vegetation

Three out of nineteen informants discuss vegetation. The vegetation here refers to the grass, the plants, and greenery. People enjoy the natural elements after working or studying. They think the green space refers to nature and it makes them feel relaxed. One of the informants (I-2) says “I really like being here by myself, just walk around the water and the vegetation and think about life.” The greenery makes them feel refreshed and provides a place to get away from work and the other stresses of life.

4. Others

There are four other elements and features mentioned the participants discuss during the interviews:

a) Sitting area and benches: People enjoy the sitting area and the benches because they can enjoy the view of the lake or the view from the other side of the lake. They feel relaxed when they sit under the sun.

b) Lights: People like the lights during the nighttime and the reflection of the lights on the water. Some of them think that when they walk along the pathway during the night time, the lights make them feel safe.

c) Dallas Area Rapid Transit (Orange Line): People like the light rail because of its convenience. In addition, the train sometimes creates a nice view in the

waterfront environment. As informant (I-11) says, “I like the scene of the train passing by.”

d) Canal: Only one participant (I-7) thinks the canal is his favorite feature. This informant says that he enjoys the Mandalay Canal section of the development very much.

According to the results, 12 elements and features are discussed as the least favorite ones. The older pathway is the least favorite according to 19 participants (21%). In addition, three participants, or 16% of the total number of interviewees, say that the water of the waterfront is their least favorite feature (see Figure 4-2). The light rail, construction, undeveloped areas, and large population are each the least favorite element or feature for two participants (11%). Finally, other least preferred elements and features discussed by the participants are the freeway, big buildings, boundaries, no access to the water, and the sycamore trees.

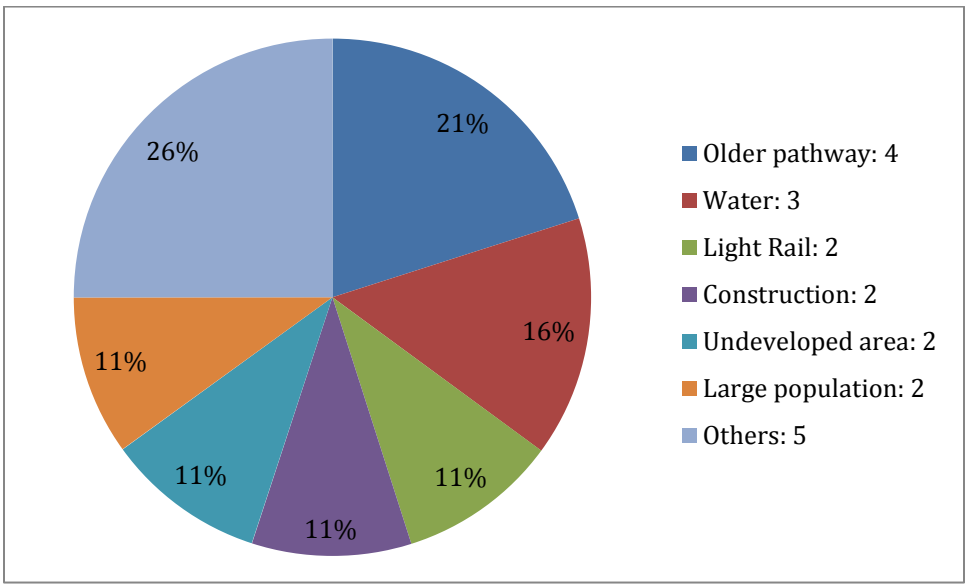


Figure 4-3 Least Favorite Elements and Features

1. Older Pathway

Four informants say that the older pathway is their least favorite feature of the waterfront landscapes. All four pointed out that the brick surface of the older pathway is uneven, making it

difficult for people to use this part for running or jogging. In addition, they suggest this is unsafe because occasionally the uneven brick surface causes people to trip and/or fall down, which is dangerous. For example, informant (I-9) says “The least [favorite element or feature] is just right here in front of the floor, which is really uneven and broken.” Moreover, according to informant (I-10), “The brick is a little bit uneven and I can trip over it.” Informant (I-8) does not prefer the part of the pathway under the bridge because it dark and somewhat frightening: “Some of the paths over there are old and spiders are everywhere and it’s kind of dark sink areas.”

2. Water

Even though during the interview some of the informants pointed out that Lake Carolyn is their most favorite feature, some informants report that the water in the lake is their least favorite feature of the waterfront landscape. “Dirty” and “bad smell” are the words that these participants used to explain why they choose the water as their least favorite feature. As informant (I-6) says, “When it flooded, it definitely got sewage water there. There were dead fish smells for like two months.” In addition, when asked why the water is her least favorite feature, informant (I-19) reports “I think it’s the how dirty the water is. Cause there’s a lot of run off.”

3. Dallas Area Rapid Transit (Orange Line)

Two of the informants report that the light rail is their least favorite element of the waterfront landscapes. One of them (I-5) says he used to live beside the DART station, but because of the construction there, he moved out. Even now, when the light rail passes the station, he thinks it is very noisy. In addition, informant (I-10), who lives near the station, says it is very noisy.

4. Construction

Two of the informants (I-3 & I-13) report that the construction is their least favorite feature in the waterfront landscapes. Because of the noise and the large fence around the construction area, which obstructs the views of the waterscapes, people cannot properly enjoy the waterfront. In addition, the area near the Omni Hotel has been under construction for a long time. As informant (I-13) says, “It’s just they are been there for a long time. So once it gets be built up it

will be nice." This means people look forward to the end of construction. However, people are distracted by the dirty environment and dusty air.

5. Undeveloped Area

10.5% of the informants say that their least favorite feature is the undeveloped areas. The undeveloped areas consist of grass and a few trees, offer no activity such as retail or residential use, and are often covered in animal feces (see Figure 4-4). Most of the participants point out that the view there is not enjoyable and there is nothing pleasant to look at. For example, according to informant (I-4) "There's nothing right now. So it's not very pretty"; to informant (I-16) "It needs maybe some more plants and some area with more lives"; and to informant (I-7) "This kind of development really nothing to look at. Walk I guess and running are not really very entertaining." In addition, informant (I-11) says "My least favorite is there is not a lot of activity. The lack of proximity to stores." In the Las Colinas Urban Center, there are several places that are undeveloped and only covered with grass. Residents prefer spaces that offer more activities and more retail stores for them to spend time with friends and family.

6. Large Population

Two of the informants (I-12 & I-14) think that the large population at the Las Colinas Urban Center is the least favorite element for them because of the noise and the trash made during some events. For example, as informant (I-12) says during the interview when asked about his least favorite element or feature, "I guess all the food traffic, all the people passing by my apartment every day. I can hear their conversations." Sometimes large amounts of people will make noise and create trash, which may influence residents' daily lives. In addition, because the Lake Carolyn is large, sometimes there are boat races or other events that will attract many people to the waterfront landscapes. For example, as informant (I-14) recalls, "Like last year we have the event. When they threw some balls and cards into the lake, it was frustrating here." Events may good for tourists to the Las Colinas Urban Center; however, for the residents who live there, events that bring with them large populations of tourists will cause many problems.

7. Others

There are five other elements and features that are discussed during the interview as being least preferred, accounting for the remainder 26% of all the elements and features.

a) Freeway: Informant (I-1) thinks the freeway is too close to the waterfront landscapes and may negatively affect how people enjoy the natural view of the waterfront. In addition, sometimes people will hear the noises of traffic when they sit on the benches. For example, as informant (I-1) says, “I think the freeway it kind of distracts.”

b) Big Buildings: One of the informants (I-2) mentions that she is from California, where there are not many big buildings: “I’m from California, I’m used to water kind of beach water. But the building here is too big and in a high density” She also reports that she does not prefer the development around the gondola marina because she could not enjoy the water there. In addition, according to her the development there is too dense so cannot recall the feel of nature. This indicates that although big buildings sometimes create an enjoyable background for the waterfront view, for the people who are looking for natural scenery, big buildings can be a distracting element.

c) Boundaries: People sometimes have individual preferences for shapes of landscapes. For example, informant (I-15) points out that he prefers lakes with round instead of irregular boundaries: “The lake boundary isn’t round at all. I prefer a round shape and do the jog around it.”

d) No access to the water: People prefer to be able to easily access the water if they live near waterfront landscapes. In fact, as informant (I-16) says, “The least favorite is there’s not a beach or like a walk-in to put our feet in the water.” Even though this informant thinks the water is not clean enough to enter, she still prefers to be able have access to the water.

e) Sycamore Trees: One informant (I-17) says that the sycamore trees are his least favorite element in the waterfront landscapes. According to him, “Sycamore trees are the nastiest plants on the earth. Because all the things they shed on the ground. And they are very allergy-prone horrible plant.”

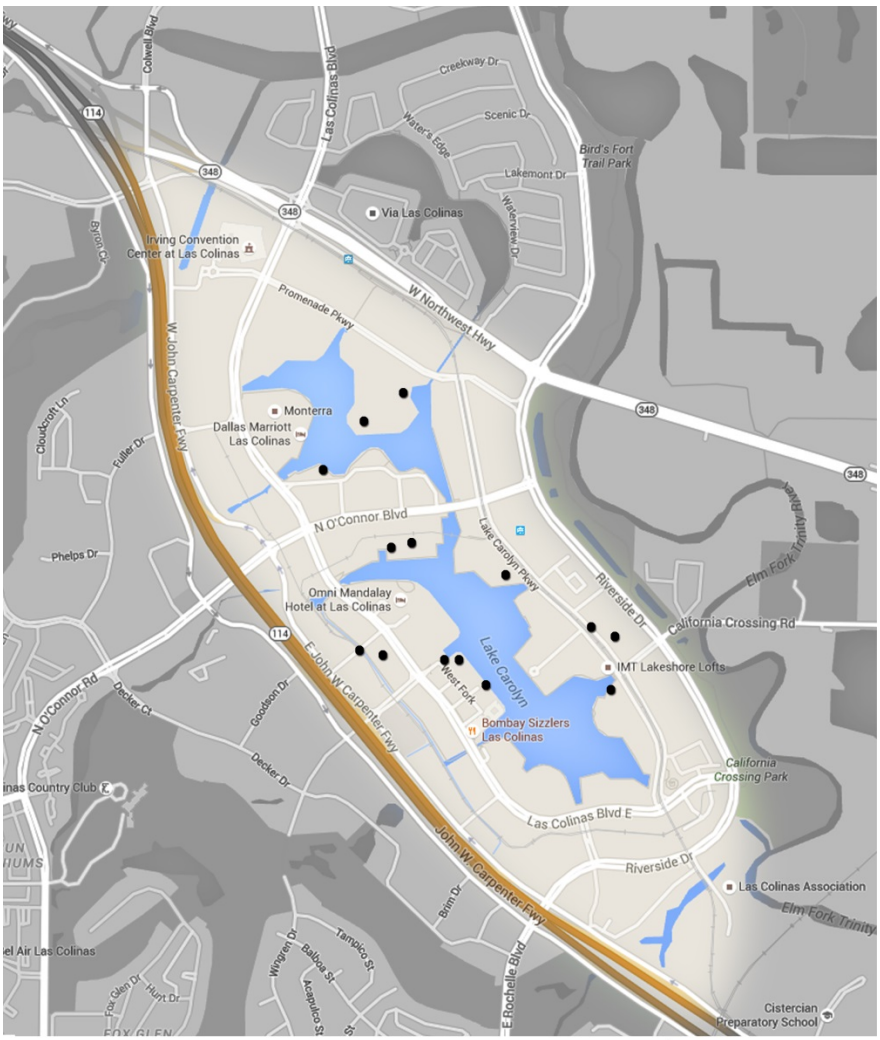


Figure 4-4 Least Favorite Features

4.2.4 Residents’ Perceptions of Water Characteristics

This section of the research discusses interview responses to two questions about water characteristics. These questions are used to identify the characteristics of the water that

residents perceive as most or least favorable. In addition, the follow up questions are used to understand the reasons why people do or do not prefer these water characteristics.

- What characteristics of water in the Las Colinas Urban Center do you favor the most? Why? (Such as color, sound, shape, movement, spaciousness, etc.)
- What characteristics of water in Las Colinas Urban Center you favor the least? Why? (Such as color, sound, shape, movement, spaciousness, etc.)

There are seven characteristics that are classified under four categories of water that residents enjoy the most. As shown in Figure 4-5, “Movement” is the category of water characteristics that residents like the most, which include 42% of all the characteristics. 37% of the total characteristics that residents most prefer are subsumed under the category “wild life,” which makes the place seem more alive. “Sound” is the third category that residents enjoy the most, and is 16% out of seven characteristics. Finally, 21% of the characteristics are classified into “others,” which include the view, no boats or activities on the water, reflection, and the size of Lake Carolyn.

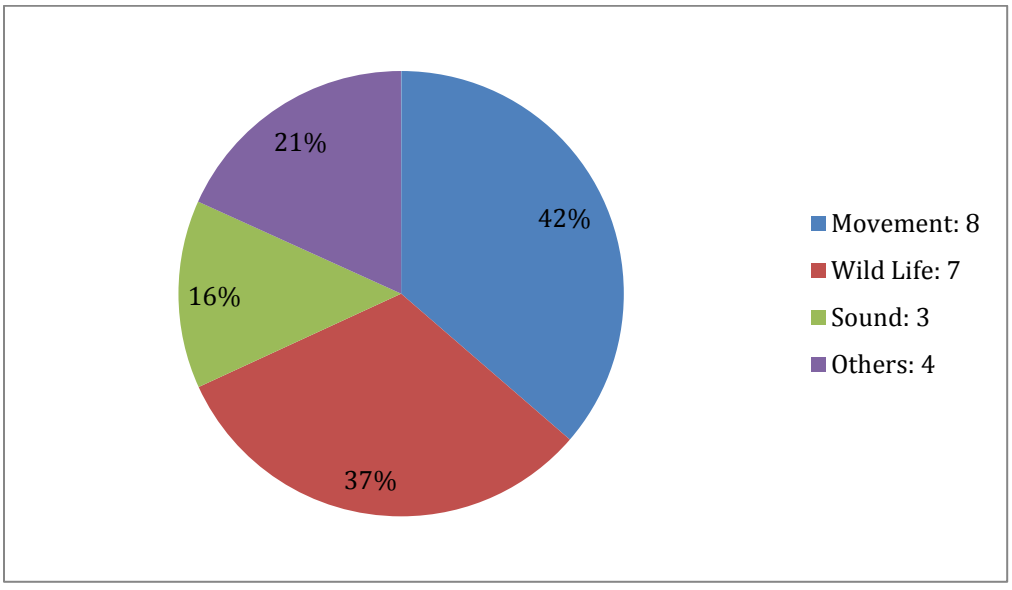


Figure 4-5 Most Favorite Water Characteristics

1. Movement

Eight informants report that movement is their most favorite water characteristic. “Pretty, natural, peaceful, and cool” are words used to describe movement by the participants during the interview. As informant (I-6) says, “I like the movement. It is cool if it is really windy sometimes and the water will have some small waves.” According to informant (I-12), “I like the movement. It looks peaceful.” Moreover, informant (I-16) points out that when the sunshine hits the moving water, it glitters and is beautiful. Finally, some of the informants report that they enjoy the moving water as it provides them with a sense of nature.

2. Wild Life

Seven of the informants think that the presence of wild life makes a significant difference for the water. The wild life is considered as one of the water characteristics because the wild life represents the quality of the water for two reasons: most preferred wild life like ducks and larger fish flourish in clean water and their presence makes the water feel alive. Residents feel like they are in real nature. For example, as informant (I-2) says “It’s cute they have little ducks around here” and another informant (I-14) says “I like the ducks and fishes.” Informant (I-15) points out that many children enjoy the ducks. Sometimes without the wind, the lake has no waves and is still like a hard flat space. The wild life brings some little waves to the water that makes people feel alive.

3. Sounds

Three out of the seven favorite water characteristics concern the sound of the water. For example, informant (I-10) says that “I like the sound. It’s nice because it’s relaxing, especially when I go for a run.” The sound can be birds flapping their wings or tweeting, ducks jumping into the water, the falling water of a waterfall, or the moving water of a lake or stream. All of these sounds are from nature, which are more soothing that the sounds of a city. Informant (I-8) reports that the sound of the waterfall is his most favorite characteristic of the water.

4. Others

a) View: People enjoy the view of the water. Informant (I-3) points out that “It’s beautiful with the view of the water. It looks good.”

b) No Boats or Wild Water Activities: Informant (I-5) mentions that “There are no motor boats or wild water activities. So it’s kind of calm and peaceful water.” Also, residents do not like the events like boat racing that break the feel of nature.

c) The size of Lake Carolyn: Informant (I-7) thinks that the size of the lake is good because it is not a small pond. She can enjoy the entire view of the lake and feel like she is a part of nature.

d) Reflection: Several participants say that they like the glitter of the sunshine on the water. Other participants report that they enjoy the reflection of the buildings on the water. Per informant (I-16), “Because of the light reflection of the water with the lights on our buildings we have around. It kind of gives you both of city but it really enlivens in the water.”

Five water characteristics are discussed as the least favorite during the interviews. As shown in Figure 4-6, the color is the least favorite water characteristics for 42% of the participants. 32% of the residents say that their least favorite water characteristic is the trash. 11% of the participants also point out the flood issues are their least preferred characteristic. Finally, other characteristics such as no swimming or fishing and bad smell are least preferred by 11% of the residents.

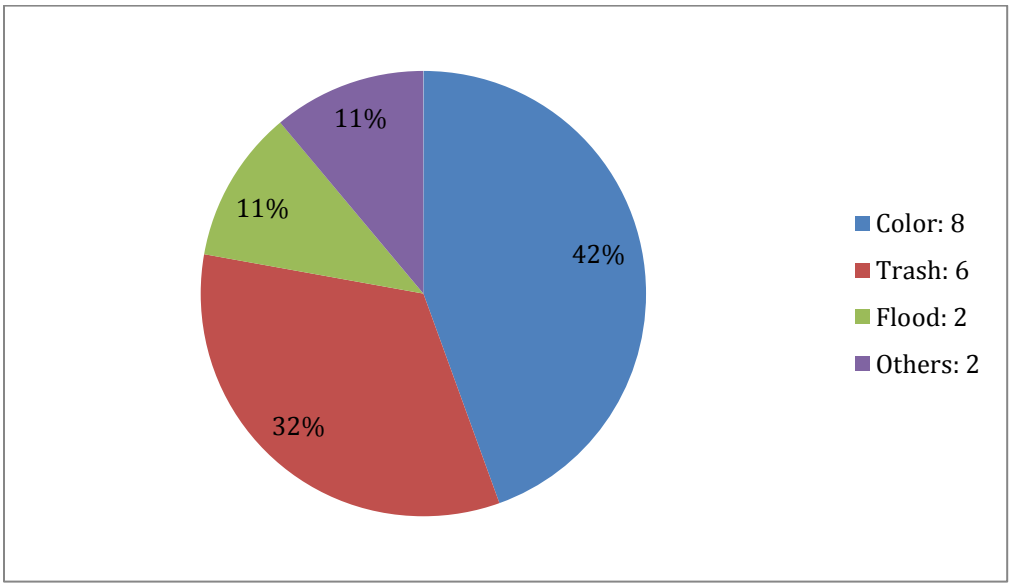


Figure 4-6 Least Favorite Water Characteristics

1. Color

Eight participants say that the color of the water is their least favorite water characteristic of the waterfront landscapes in the Las Colinas Urban Center. Whereas the water is blue when seen it from a long distance, it is green and mossy when viewed up close. The participants cannot see what is under the water because it is unclear. Therefore, the participants are not satisfied with the quality of the water. They want to see water that is clear, clean, and blue in color. However, some of the participants believe that Lake Carolyn and the Mandalay Canal have dirty, unclean, and sometimes distracting water. In fact, according to informant (I-5) when asked about his least favorite water characteristic, “The color actually. Actually, it is dirty.” “I think it’s not clean enough to be swimming around,” says informant (I-3). In addition, participant (I-16) points out that “it’s so dark. It’ll be nice if it is more blue or green or something.”

2. Trash

Six out of nineteen residents mention that their least favorite water characteristic is the trash. The participants do not like to see any trash or runoff in the water, especially near the corner of the lake beside the bank. As informant (I-2) says, “Sometimes in the corners it’s not

moving. It's all trash fills up. So I don't like going around the edges and that's really terrible." The trash build up together makes the participants feel dirty and uncomfortable. For example, according to informant (I-4), "There's like a trash build up and I see a more on this side"; to informant (I-10), "Sometimes, I see some trash"; and informant (I-13), "The least, probably the corners where all the trash and refills get-together". Most residents use the words dirty or terrible to describe their feelings about the trash.

3. Flood

Two of the participants report that the flood issue around the waterfront landscapes in the Las Colinas Urban Center is their least favorite characteristic of the water. Even though he does not see or know whether it is flooding or not, one of the informants (I-12) mentions that "When it rains. It looks like it's gonna flood. I don't know whether they gonna flood. But I heard there is a bit a flood area. So it's kind of bad." Thus, some signage of flooding education may be good for the waterfront areas to help the residents feel safe by increasing the knowledge about flooding.

4. Others

10.5% of the participants report that no swimming and fishing, and the bad smell are their least favorite water characteristics of the waterfront landscapes.

a) No Swimming and Fishing: People are interested to touch the water or play with the water. Therefore, as informant (I-3, I-15) points out, he would be very happy if he could swim or fish in the water: "If they allow to swim here, I will jump and swim." Also, informant (1-15) says "I want to swim in the water, but they are not allowed us to do."

b) Smell: One of the informants points out that after a big storm, the smell of the water is like dead fish and lasts for nearly two months. The bad smell of the water makes some of the participants wonder whether some chemicals are being used in the water. For example, as informant (I-6) says during the interview, "All the fish died and they put chemical in the water to try to clean it. In some days, the water

will be neon green. There is clearly something. There were dead fish smells for like two months."

4.2.5 Residents' Perceptions of Accessibility

All nineteen informants report that the access of the waterfront landscapes in the Las Colinas Urban Center is good, convenient, or easy. Informant (I-7) says "I feel like it's great. I think been able to see this close is absolutely incredible. Physically is good because it can get run around it." In addition, informant (I-2) thinks that the access of the waterfront is motivating: "I think it's really motivated me to get out and run more." Some of the participants in this study point out that the access to the waterfront is easy and convenient. They can simply walk downstairs and they are on the waterfront. Also, some of them have the visual access from their residences. Therefore, they enjoy the view of the waterfront while in front of the waterfront, at home, or on their balconies. "I think it's good because we have a short distance from our apartment to the water," reports informant (I-18), who also enjoys sitting on the benches and taking in the view of the water and the feel of the warm sunshine. Other informants (I-9, I-16) indicated that they had waited for a long time to rent a more expensive apartment with open views to the waterfront. According to informant (I-16), "So I have an apartment that is in the corner of the building. So every single one of my windows has a view of the water. I have my left window shows the gondolas the entrance, and then it goes to all the way to forward into the lake and I mean I pay more money to get that view but that's my favorite reason so I wake up I see the water. It's fun when its rains you know cause you can see the rain hits the water I love when it sounds when the rain hits the water. When under the storm the other day it's perfect. And then when I walk downstairs, I'm so close to the water I can just be right after it when I want to so. That's my favorite."

Some of the residents also work at or near the Las Colinas Urban Center. They feel like the access to both their home and the office is convenient, and on their way to work they can enjoy

the view of the waterfront landscapes at the same time. “I like this area because it is where my office building is,” says informant (I-18).

On the other hand, informant (I-8) points out that although the access for residents is convenient, the access for the public is not as convenient because there are not enough parking spaces for the public to use around the waterfront. However, this informant points out that the Trinity Trail system has sufficient parking for public use, and he suggests that the Las Colinas Urban Center should do so as well.

4.2.6 Improvements and Additional Information

All of the participants report that they very much enjoy the waterfront landscapes at the Las Colinas Urban Center. However, they also have their least favorite elements and features, their least favorite water characteristics, and their suggestions for improvements in these and in accessibility. In addition, though, not all of the participants have suggestions for improvements.

4.2.6.1 Suggestions for Improvements

Nearly 25% of the participants in this research have no suggestions for improvements to the waterfront landscapes in the Las Colinas Urban Center. The remainder of the participants have eleven suggestions for future improvements. As shown in Figure 4-7, 21% of the participants with suggestions want to have more developed areas that offer activities, retail, and/or places to spend time with friends and family. In addition, they want more trees in these areas. 11% of the participants hope for improvements in the quality of the lake water. Another 11% of the participants point out that the trash in the corner of the lake should be cleaned. Furthermore, 11% of the residents think that there should be more open spaces for activities or dog parks. One of the participants wants to have more benches so people can better enjoy the sun and the view of the lake. Finally, 26% of the participants think the waterfront landscapes at the Las Colinas Urban Center have no need for improvements.

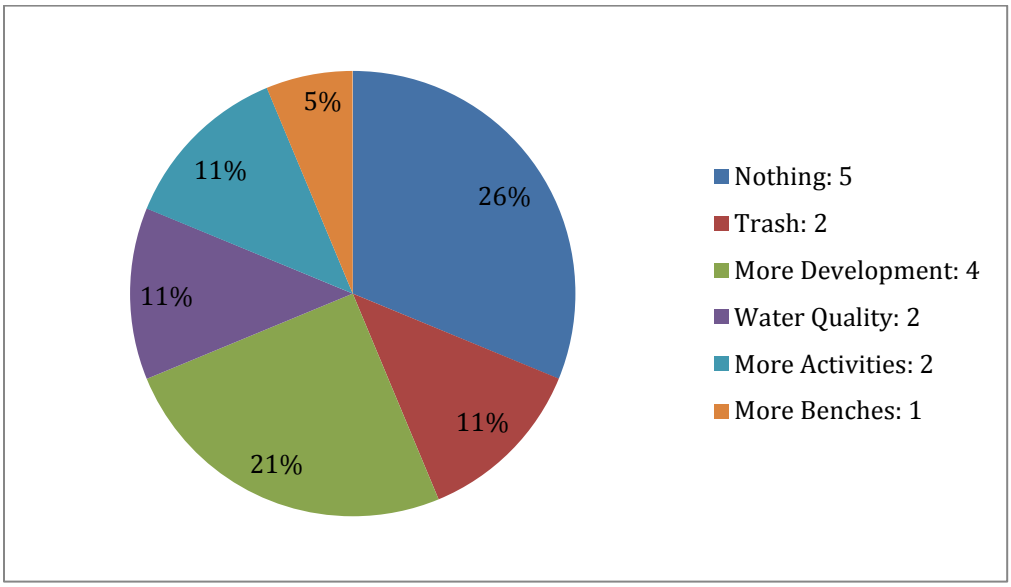


Figure 4-7 Improvements

1. More Development

Four of the participants suggest that the Las Colinas Urban Center should have more development in terms of retail, restaurants, coffee shops, and/or stores. For example, as informant (I-3) says when asked about suggestions for improvements, “Dining, coffee shops, restaurants. Just more restaurants.” In fact, the participants report that they enjoy the waterfront, but that they also want places there where they can enjoy the beautiful view with their friends. In regards to the undeveloped areas, the participants want to have something pleasing to look at; for example, more trees or some sculptures. Finally, according to informant (I-17), because Lake Carolyn is so large, while walking around, it would be wonderful to have places to relax in the shade, drink coffee, and enjoy the lake view.

2. Trash

Two of the participants (I-2, I-19) report that the trash at the corner of the lake should be cleaned. As other participants say when asked about their least favorite water characteristics, the trash or runoff in the lake makes people feel dirty and terrible. Therefore, the participants in this study want an environment that is cleaner and well maintained.

3. Water Quality

11% of the participants in this study want improved water quality. Some of them think the water is not clean or clear enough for swimming. For example, as informant (I-6) says, “I don’t know what happens, maybe because of the storm the water seems to go dirty.” This means that the participants hope for clean, clear, and blue water in their waterscapes.

4. More Activities

Several informants say they would like to swim or fish in the water at the Las Colinas Urban Center. Except for the gondolas, there is nothing for the participants to enjoy in the water. Thus, many of them want to have more activities around the waterfront. Furthermore, two informants (I-16, I-19) point out that sometimes they do not know where they could walk their dogs. In addition, there is a lack of plastic bag dispensers for them to use to clean up after their animals. Therefore, they want a dog park or other open spaces for them to more conveniently exercise their dogs.

5. More Benches

According to informant (I-17), there are not enough benches along the development area for people to use. As he says, “I wish there are more benches. There are benches at the end but in this area where I’m basically at there are zero benches and it will be nice to be able to sit and watch the water instead of standing and watch the water.”

6. Nothing

Five of the participants in this research report there is nothing that needs improvement for the waterfront landscapes in the Las Colinas Urban Center. They very much enjoy the waterfront landscapes there, and they hope it continues to be kept as clean and as well maintained as it is now. Finally, informants (I-9, I-10) believe the waterfront landscapes could be improved; however, they did not mention in which aspects they would like to see the improvements.

4.2.6.2 Additional Information

Some of the informants make interesting observations during their interviews; observations that do not neatly fit in with the previous categories. For example, informant (I-1) observes that while riding in a gondola, people can enjoy the waterfront from a different perspective, a perspective quite different from what people are exposed to on the banks of the lake. In addition, informant (I-5) observes that it is very difficult and tiring to try to walk from one side of Lake Carolyn to the other: “It will be better to have more retail near the apartment or build a bridge that crosses the whole lake, which is not possible for now”. Finally, informant (I-6) points out that it is nice to live near where she works because she can enjoy the pretty scenery during her commute.

4.3 Passive Observations

The passive observations are used to help this researcher better understand the waterfront design characteristics in the Las Colinas Urban Center. The first step of the observation is to walk along the site and identify the design characteristics of the Las Colinas Urban Center such as elements and features, water characteristics, and access to both water and the waterfront landscape areas. The second step of the observation is to take photos of the landscape design characteristics of the waterfront landscapes. Table 4-3 shows the schedule of the passive observations.

Table 4-3 Observation Schedule

Date	Time	Location
02-27-2016	12:00 p.m. – 3:00 p.m.	The Mandalay Canal
02-28-2016	10:00 a.m. – 2:00 p.m.	Southern part of Lake Carolyn
03-01-2016	12:00 p.m. – 1:00 p.m.	Northern part of Lake Carolyn
03-22-2016	12:00p.m. – 2:00 p.m.	Southern part of Lake Carolyn
03-26-2016	10:a.m. – 2:00 p.m.	Northern part of Lake Carolyn

4.3.1 Elements and Features

4.3.1.1 Boundary

The waterfront landscapes of Las Colinas Urban Center are located around Lake Carolyn and the Mandalay Canal, which are surrounded by many buildings (see Figure 4-8). The external boundary refers to the buildings beside the water and the outer roads beside the undeveloped areas, and the internal boundary refers to the water itself, which are Lake Carolyn and the Mandalay Canal.

Figure 4-8 Waterfront Landscapes in Las Colinas Urban Center

4.3.1.2 Enclosure

The waterfront landscapes are surrounded by different buildings and roads, which offer various views. Some of the views are blocked by the buildings, and some of them are open spaces from which one can see the scenery at a long distance. The buildings along the waterscapes create a background for the view from the other side of the lake or the canal (see Figure 4-9). In addition, the space between separate buildings frames the scenery from a further distance (see Figure 4-10). In addition, the undeveloped areas or the open spaces are irregularly shaped, which creates interesting geographical patterns of the nature and allows people to enjoy the views from multiple perspectives (see Figure 4-11).

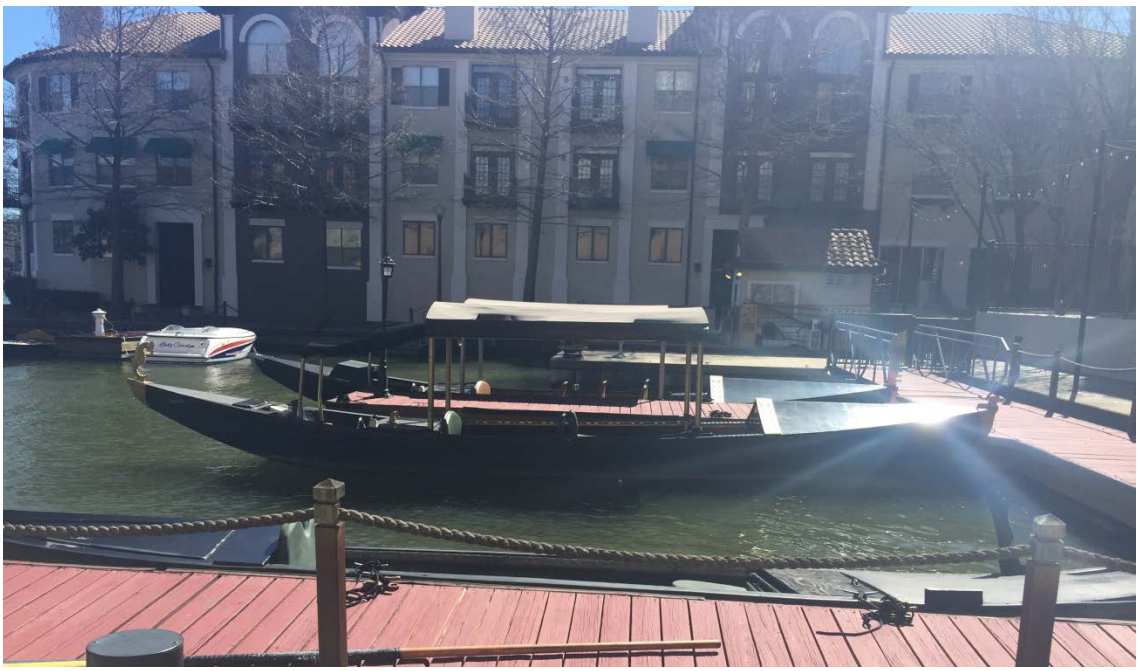


Figure 4-9 Building Acting as a Background

Figure 4-10 Buildings Framing the View

Figure 4-11 Scenery through Open Spaces

4.3.1.3 Land Form

Most of the waterfront landscapes in Las Colinas Urban Center are flattened or have a naturally even landscape. However, some of the open spaces have sight contour changes that help people remember the feel of nature. Even though the water in Lake Carolyn and the Mandalay Canal is deep, the surface of the water is close enough to their banks so the residents of the Las Colinas Urban Center can enjoy the water because it is not separate from

the landscapes. The elevation changes seen in the waterfront landscapes are due to the retaining walls that help protect the buildings from runoff storm water.

4.3.1.4 Features

The features that are separated from the surrounding environment in the waterfront landscapes are Lake Carolyn, the Mandalay Canal, and the waterfalls on the canal. Lake Carolyn is 125 acres and has an irregular boundary, which helps people feel like the waterscapes at the Las Colinas Urban Center are natural (see Figure 4-12). The Mandalay Canal is connected to Lake Carolyn and is responsible for channeling the excess storm water to the Lake and then to the Trinity River. In this way, the Mandalay Canal protects the buildings along the both side of the canal. In addition, there are two small waterfalls on the canal. Finally, as the waterfalls create pleasing sounds of falling water, the features of the waterfront landscapes satisfy not only the residents' eyes but also their ears.

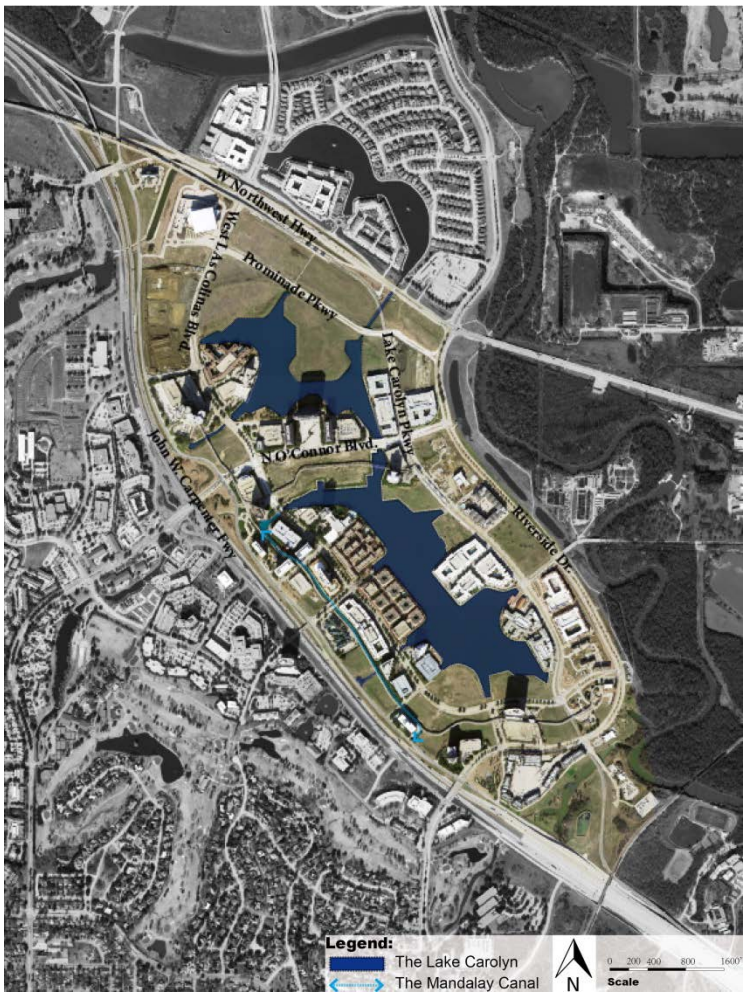


Figure 4-12 Waterscapes in Las Colinas Urban Center

4.3.1.5 Vegetation Patterns

Tree cover, scrub cover, and grassland are three different types of vegetation that cover the waterfront landscapes in the Las Colinas Urban Center. Most of the trees and scrubs are located within the developed areas. However, the undeveloped areas are all covered by the grass.

1. Tree Cover

   All of the developed areas are covered with canopy trees that create a beautiful scene when viewed from both sides of Lake Carolyn and provide people with shade when they sit on the benches and enjoy the view (see Figure 4-13). Deciduous trees change

their appearance seasonally, which provides different scenery throughout the year for the residents to enjoy. Moreover, the branches of the deciduous trees do not block the sunshine during the winter so it can hit the windows and warm the residences on the other side of the trees. The canopy of the evergreen trees not only provides the shading area for people to avoid the sun in the summer but also makes the site feel alive during the wintertime when the color of other plants fade as their leaves die due to the cold weather.

Figure 4-13 Canopy Trees along the Developed Areas

2. Scrub Cover

Along the developed areas, shrubs, ground cover, and blooming plants are carefully arranged in planting beds or around the trees (see Figure 4-14). In addition, because of the different levels of the retaining walls and planting bed, the shrubs not only create a focal point along the sidewalk for people to enjoy but also block views into the residences.

Figure 4-14 Shrubs and Plants with Blooming Flowers in Planting Bed

3. Lawns and Open Spaces

On the other hand, instead of canopy trees, the undeveloped areas are covered with grass, which provides a natural view of the landscapes and balances the urban forms around it (see Figure 4-15). In some areas, there are a few contour changes like small rolling hills that give a nice feeling of being in nature.

Figure 4-15 Undeveloped Area

4.3.1.6 Evidence of Human Impact

The various evidence of human impact includes the benches, lights, paving, bridges, docks, overhead structures, bike holders, signage, activity areas, and trail system. All of these increase the residents' satisfaction with the landscapes and help provide convenient accessibility throughout the Las Colinas Urban Center.

1. Benches

As shown in Figures 4-16 through 4-18, there are different types of benches along the waterfront areas in the Las Colinas Urban Center. Some of them are made of wood and others are made of metal. Furthermore, the different developed areas have different styles of benches that match with the adjoining architectural design. Numerous benches are provided for residents or visitors to sit on while they are enjoying the waterfront landscapes.

Figure 4-16 Wood bench in Las Colinas Urban Center

Figure 4-17 Metal Benches in Las Colinas Urban Center

Figure 4-17 Continue

Figure 4-18 Stone bench in Las Colinas Urban Center

2. Lights

Similar with the benches, the lights that brighten the Las Colinas Urban Center are of different styles that follow the adjoining architectural design. Some of the lights are in close proximity to the windows of the residences and may disturb the residents at night. To help prevent disrupting sleep patterns, the lamp housings have been painted black so as to reduce the glare of the light (see Figure 4-19).

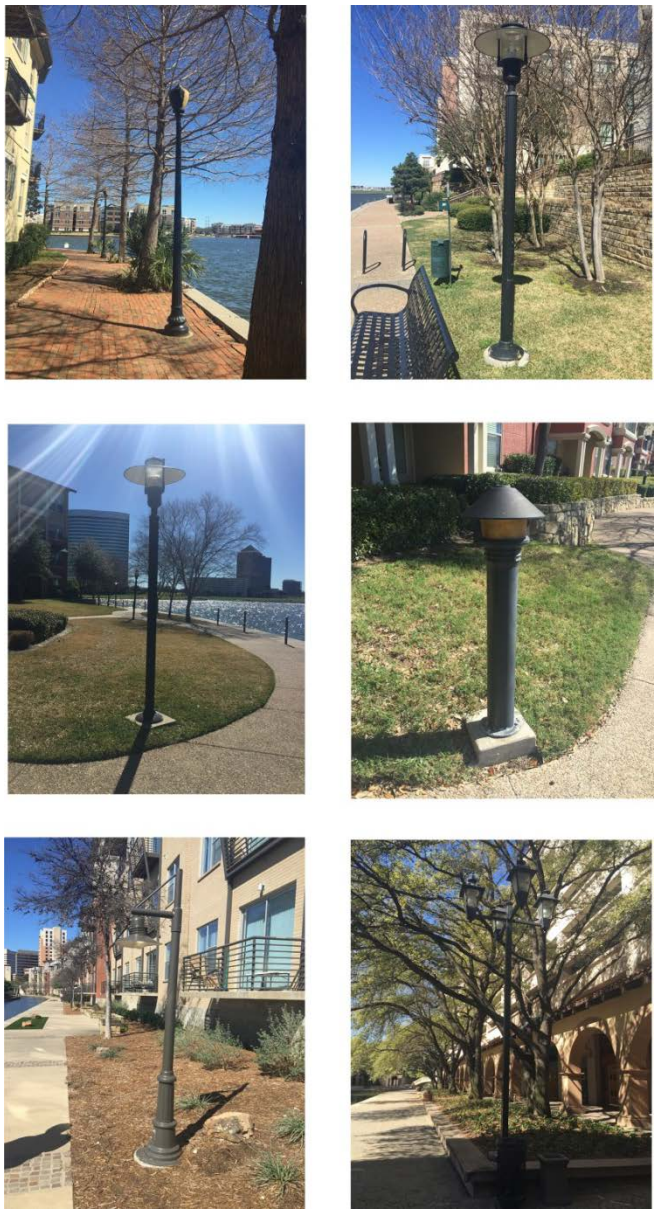


Figure 4-19 Different lights in Las Colinas Urban Center

3. Paving

There are different types of paving along the waterfront area, and each is based on the development around it. Most of the paving around the developed areas are brick, or designed by architects or landscape architects. In the undeveloped areas, the paving is undersigned or made of concrete. However, although the red brick paving around the developed areas is more attractive, some of it is not well maintained; for example, some of the bricks are so uneven that they may cause people to trip or fall when they are running or doing other types of exercises (see Figures 4-20 through 4-24).

Figure 4-20 Red Brick Paving

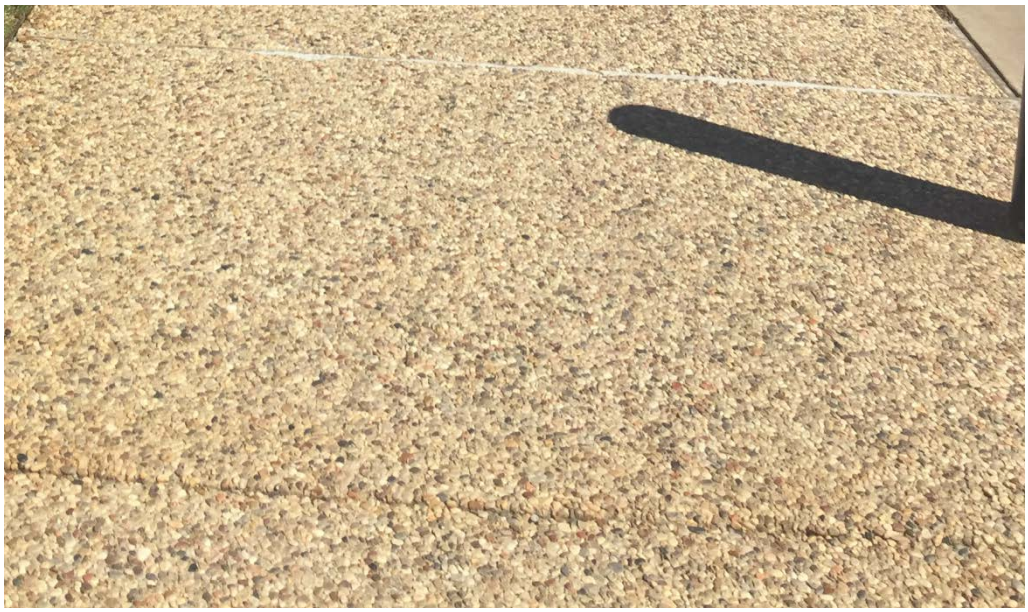


Figure 4-21 Paving

Figure 4-22 Brick and Concrete Paving

Figure 4-23 Brick and Concrete Paving 2

Figure 4-24 Brick Paving

4. Bridges

The Las Colinas Urban Center has many bridges. Some of the bridges are for vehicles and some are for pedestrian use only. For example, along the Mandalay Canal, there are bridges that people can use to conveniently cross to the other side of the canal. However, because of Lake Carolyn's large size, it would be too burdensome to make a pedestrian bridge that spans its entire length or width. Therefore, Lake Carolyn has only one bridge, on N

O’Connor Boulevard, where both vehicles and pedestrians can cross the lake. Otherwise, people can walk to the other side of the lake using the path.

Figure 4-25 Bridge over the Mandalay Canal

Figure 4-26 Bridge over Lake Carolyn

5. Docks

For the gondolas and maintenance boats, docks are located around Lake Carolyn and the Mandalay Canal. Some of them are usually empty and are only used to temporarily dock the ships or gondolas. In addition, one of the docks belongs to Gondolas Adventures, Inc. and provides gondolas that residents or visitors can use to enjoy different views than those offered from the banks (see Figure 4-27). Most of the docks are made of stone (see Figure 4-28), but some are made of wood.

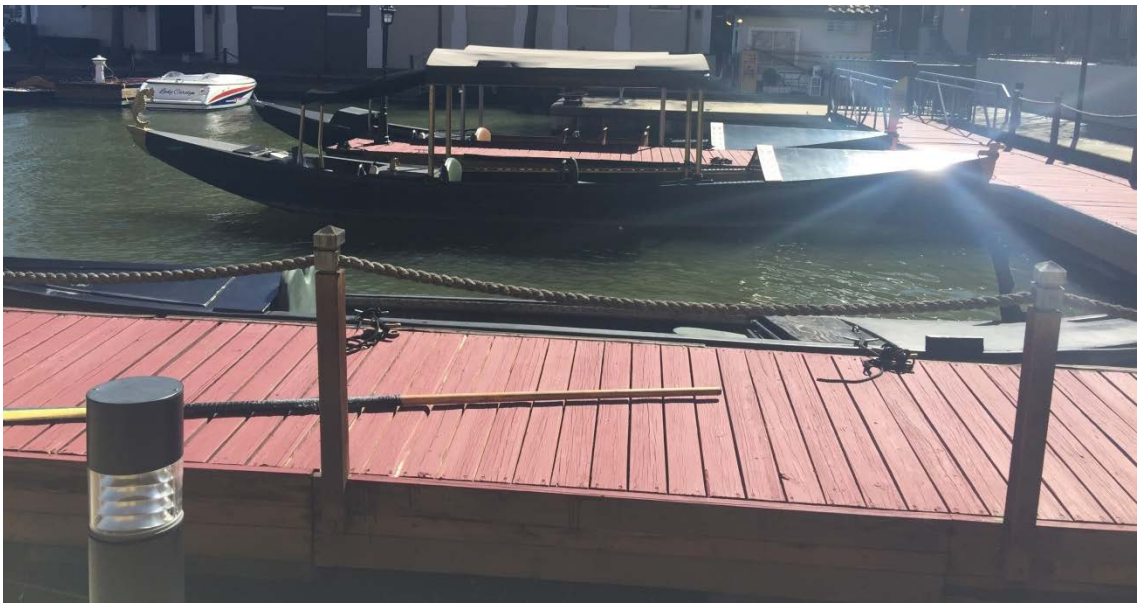


Figure 4-27 Docks for Gondolas

Figure 4-28 Stone Docks

6. Overhead Structures

There are two overhead structures located around Lake Carolyn. One is located near the southern part of the lake and the other near the northern part. The overhead structure in the southern part of the lake is designed to help coordinate access from the road. This structure also separates the space from sitting area and the path around it (see Figure 4-29). The pavilion in the northern part of the lake provides a shady and relaxing area for people to gather (see Figure 4-30).

Figure 4-29 Overhead Structure in Southern Part of Lake Carolyn

Figure 4-30 Pavilion in Northern Part of Lake Carolyn

7. Bike Racks

All of the developed areas have bike racks made in the same style and with the same materials as the benches located around them. Thus, they fit well into their surrounding environment. In addition, they are convenient for people who use their bikes to travel around the lake (see Figure 4-31).

Figure 4-31 Bike Racks in Las Colinas Urban Center

8. Signage

Various signage dots the waterfront landscapes in the Las Colinas Urban Center. Some have messages cautioning people from jumping, swimming, or fishing in the lake (see Figure 4-32). Others act as gateways that separate the public areas from the waterfront areas (see Figure 4-33).

Figure 4-32 Signage for Preventing People

Figure 4-33 Signage at the Access from Public Area

9. Activity Areas

There are insufficient activity areas in the Las Colinas Urban Center for the residents. There are only a few picnic tables, benches, or workout facilities (see Figures 4-34, 4-35, and 4-36). These facilities are only in the developed areas. In contrast, the undeveloped areas consist only of grassy open space, and people can gather there or exercise, but there is no shade and the grass is not necessarily well maintained (see Figure 4-37).

Figure 4-34 Sitting Area with Plants

Figure 4-35 Workout Facilities

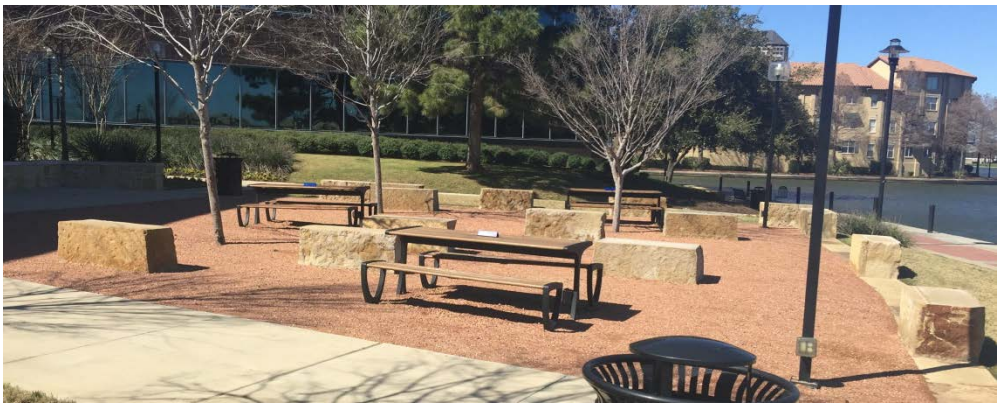


Figure 4-36 Gathering Area with Table and Chairs

Figure 4-37 Undeveloped Area

10. Trail System

The trail is adjunct to the lake and the canal. Behind the hotel and in the northern part of Lake Carolyn, the trail is not connected to the main pathway. Other than that, the trail system is well connected to every apartment, bridge, and all public areas along Lake Carolyn and the Mandalay Canal. Residents often jog, run, or just walk along the trail.

4.3.2 Water Characteristics

4.3.2.1 Spatial Expression and Edge

Lake Carolyn is 125 acres and surrounded by concrete edges as well as the Mandalay Canal. Without any vegetation buffer, the pathway is directly connected to the edges and provides spacious views of the lake.

4.3.2.2 Movement and Features

The water in the lake and the canal is keep moving during the observation time. Sometimes strong wind drive waves from the lake. The drop of waterfall on the Mandalay Canal speed up the movement of the water around that area.

4.3.2.3 Appearance

As discussed in the literature review, fluidity, clarity, color, and reflective capacity are the elements used to describe the appearance of water.

- Fluidity:

During the time of observation, the water of Lake Carolyn moves from south to north. Sometimes strong wind drives large waves on the lake. Although the water in the Mandalay Canal moves from north to south, it has waves similar to those of the lake because the two bodies of water are connected with each other.

- Clarity:

The water is not clear enough to see the bottom of the lake or the canal. In addition, because of the wind, trash accumulates in the corner of the lake and the canal, which distracts people's attention from and lessens the quality of the beautiful views.

- Color:

The color of the water in Lake Carolyn and the Mandalay Canal is blue when observed from a distance (see Figure 4-38), but greyish green when seen up close, which evokes the feeling of uncleanliness (see Figure 4-39).

Figure 4-38 Water Color from Long Distance

Figure 4-39 Water Color from Short Distance

- Reflective Capacity:

Because of the movement of the water, during windy days, there is no mirror reflection of the buildings or surrounding environment on the water. However, during sunny days, the sunshine is reflected on the water even if there is some movement. In addition, when the water has less movement, the buildings, plants, and bridges are reflected on the water (See Figure 4-40).

Figure 4-40 Reflection on the Water

4.3.2.4 Aquatic Environment

Because of the lack of vegetation in the water, the aquatic environment in the Las Colinas Urban Center refers to the animals such as ducks and birds within the waterscape (see Figure 4-41). The ducks and birds walk around the edge of the lake or swim in the water. Some of the birds sleep under the bridges. All of these animals make the waterscape feel alive. When a bird launched from the lake with shiny drops of water on its feet, this researcher overheard a child say in an amazed voice, “Mom, the bird is flying.”

Figure 4-41 Ducks in the Water

4.3.2.5 Sound

During the time of observation, the wind was so strong that no matter where one stood in the Las Colinas Urban Center, it was easy to hear the sound of the wind on the water and in the trees. There are two waterfalls on the Mandalay Canal. When walking near a waterfall, people are attracted to the sound of falling water. Furthermore, when walking along the pathway of Lake Carolyn, people hear birds chirping and ducks quacking.

4.3.3 Accessibility

The Las Colinas Urban Center has various means of accessibility. In addition, because of the convenient access it offers, residents and visitors come from different locations to enjoy diverse parts of the lake and the canal. The access to the residences is separated from the access to the public areas. Finally, although the boats and gondolas have access to the water, since public oats are not allowed on the water, the access to the water is only for the maintenance boats and emergency use.

4.3.3.1 To Water

There are a few small marinas at Lake Carolyn for gondolas from which people can enjoy the waterscapes of the Las Colinas Urban Center in a different way than walking along the pathway. The ramp from the land to the water creates another form of access for the maintenance boat and separates the public marinas from the docks (see Figure 4-42). In addition, this ramp has flat areas with rushing water that are lower than the trail adjunct to the lake (see Figure 4-43). Those areas are for temporarily docking boats. For safety consideration, swimming is not allowed in Lake Carolyn or the Mandalay Canal. Therefore, there is no access for people to the water.

Figure 4-42 Access from Land to Water

Figure 4-43 Access to Water

4.3.3.2 To Waterfront Landscapes

People visit the waterfront areas of the Las Colinas Urban Center using different avenues of access. Some residences direct front the water, and residents can also access the water from their pool areas. Visitors use the entrance from the main road.

- From Residence

  Different apartments have different means for which residents can use to visit the waterfront areas of the Las Colinas Urban Center. Some of the entrances are connected to a pathway leading to a hallway in front of the residences (see Figure 4-44). Other entrances are directly connected to residence doors (see Figure 4-45).

These different entrances separate residents from visitors and create a safe environment for the people who live in the Las Colinas Urban Center.

Figure 4-44 Entrance from Apartment

Figure 4-45 Envrance from Residents' Home

- From Public

The access from public areas to the waterfront landscapes in the Las Colinas Urban Center is as convenient as the access from the residences. This access is not only comprised of steps but also of wheelchair friendly ramps with handles (see Figure 4-46). In addition, the access from the bridges is similar to the access from the residences. For example, the steps and ramps have similar design elements as the bridges (see Figure 4-47). Finally, during the weekday observation, few people were visiting or enjoying the waterfront area. However during the weekend, more people were running, jogging, walking dogs, and/or mingling in the open spaces.

Figure 4-46 Steps and Ramps for Public

Figure 4-47 Access from Bridges

- From Pool

  Every apartment complex has a swimming pool. Some of them are outdoor pools with visual access to the water and have a door that connects to the waterfront area (see Figure 4-48).

Figure 4-48 Access from Pool

4.4 Overall Findings of the Interview and Observation Data

According to the findings in the previous section, females preference is mostly based on visual sense and the feeling of an enclosure such as with water, urban forms, vegetation, and wild life. During the observation, people are mostly gathering near the water and enjoy the view of the water, vegetation, and the view from the other side of the lake. As can be seen in Figure 4-49, females have high preference for water and wild life. Male preference, however, is based on visual sense, hearing, and usage of the characteristics in the waterfront landscape. Thus, the trail, sounds, and movement are often discussed by males during the interview process. Males equally prefer the water, trail, and movement of the water.

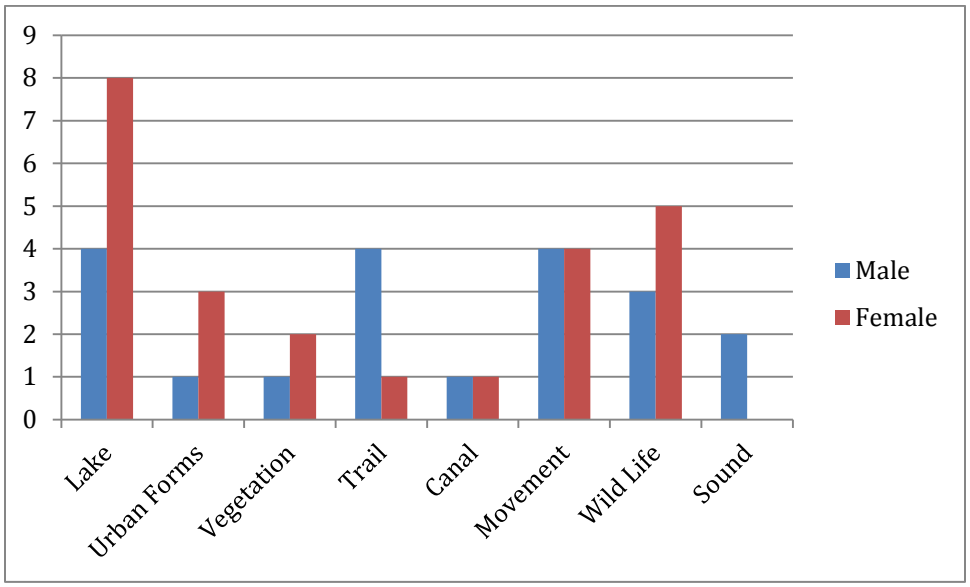


Figure 4-49 Preference Analysis 1

The older pathway, light rail, construction, undeveloped area, and large population are equally reported by males and females as their least favorite elements and features. There are less people doing exercise on the older pathway. And less people walk along the construction side because there is nothing to look at except the green fences around the site. According to the results of the interview data, females mostly dislike the water quality. However, males dislike

the poor water quality such as the color and trash in the water. Moreover, males are worried about the flood issues of the waterfront landscapes even though they do not have the evidence that the place will flood during a heavy storm. Compared to the other elements and features of the waterfront landscapes, residents pay the most attention to the water quality (see Figure 4-50).

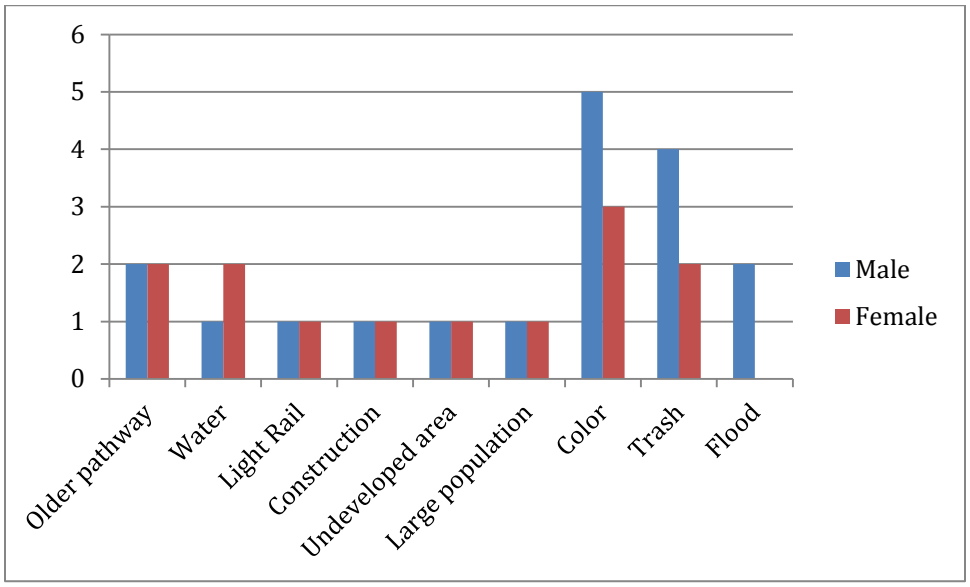


Figure 4-50 Least Preference Analysis 1

Participants from different age groups have a varying preferences (see Figure 4-51). Young adults mostly prefer the water, trail, vegetation, movement of the water, and the wildlife in the waterfront landscape as these activate their visual senses, improve their feelings of nature, and encourage them to exercise. Young adults enjoy the natural elements of the waterfronts. During the observation, many young adults are walking along the pathway and enjoy the view of the water. Some of the young adults are walking their dogs on the grass. Adults place a higher preference on the water, urban forms, movement of the water, and wildlife. Many adults are doing excercing along the pathway. They enjoy the combination of water and city life. The seniors mostly focus on the movement of the water.

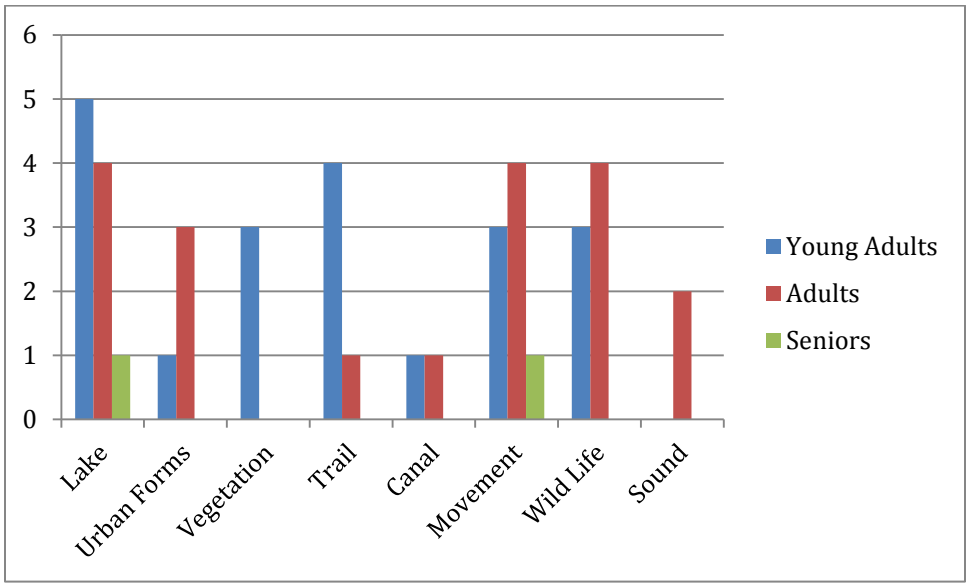


Figure 4-51 Preference Analysis 2

Furthermore, the senior participants do not have negative responses for the landscape design characteristics of the waterfront landscapes in the Las Colinas Urban Center. There are less senior walking along the waterfront areas during the observation. Both young adults and adults agree that the light rail is noisy, the construction areas are dirty, dusty, and noisy, the undeveloped area are not visually pleasing, and the large population is distracting. However, different from the young adults, the adults pay more attention to the negatives of the water quality, the safety of the environment, and any future issue that may influence the waterfront landscapes (see Figure 4-52). Young adults are more focused on the enjoyment of the environment, especially the water quality.

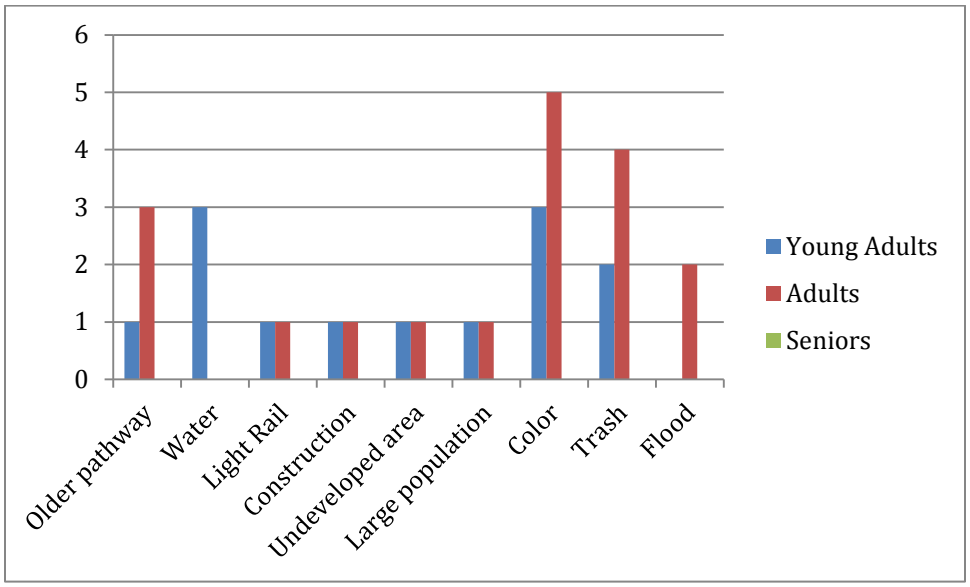


Figure 4-52 Least Preference Analysis 2

Based on these findings from the interviews, it is shown that the perceptions of the participants are mostly positive. Even though some least favorite elements and features, areas, and water characteristics are mentioned, the participants in this study like the waterfront landscapes in the Las Colinas Urban Center and enjoy the views it has to offer. These findings are derived from the interviews conducted and passive observations taken at the Las Colinas Urban Center. In fact, there are various elements and features that residents like and dislike, and some of them overlap with each other (see Table 4-4). For example, sometimes the elements and features one participant favors is the same ones that another participant dislikes. However, the water characteristics are less complex than the elements and features in terms of personal preferences. Most of the participants enjoy the same characteristics but dislike the color of the water. In addition, some of the participants reported the water as their favorite element and feature to indicate their strong desire for this critical part of the waterscape. According to the findings analysis in the previous section, participants in this research have positive perceptions of the waterfront landscapes in the Las Colinas Urban Center in terms of its elements and features, water characteristics, and accessibility (see Figure 4-49).

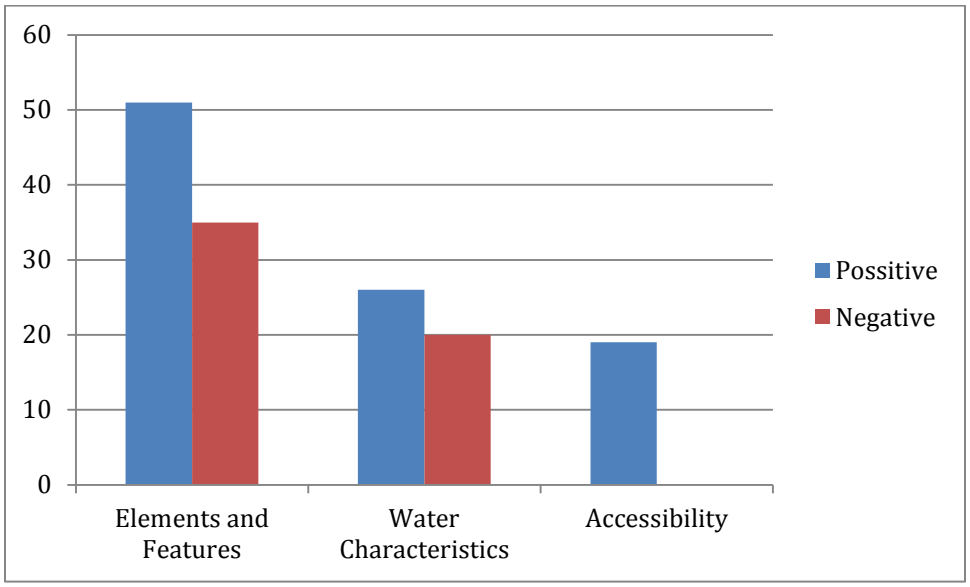


Figure 4-53 Summary of the Findings in Las Colinas Urban Center

Table 4-4 Summary of the Findings of the waterfront landscapes in Las Colinas Urban Center

Informant No.	Most favorite E/F	Why	Least favorite E/F	Why	Most favorite area	why	Least favorite area	why
Informant 1	green and water combination	Therapeutic	Freeway & train station	distract		See entire lake		too populated
Informant 2	Water	calming	big buildings	not used to it		Have most greenery		don't feel water
Informant 3	Lake	familiar	constructions, birds	noisy, smells		familiar		noisy, smell
Informant 4	city and water, promenade	safe	older pathway	uneven, dangerous		pretty, good view		nothing, not pretty
Informant 5	walking trails	enjoy the view	train	noisy		quite		retail break the trail
Informant 6	natural elements, shape of the lake	beautiful, nice, unique	sewage water, dead fish smell	dirty		beautiful, see all the view		not interesting
Informant 7	riverwalk area	nice view	undeveloped area	nothing to look at		nice view		nothing to look at
Informant 8	sitting area, open space	peaceful	path	old, spider, dark		peaceful, enjoy		no trail, nothing there
Informant 9	lake	beautiful, clean, peaceful,	brick paving	uneven, broken		pretty, quite		uneven, twist people's ankle

		quiet						
Informant 10	water, landscape, plants, urban setting	beautiful, nice view	bricks	uneven		alive		retails are dying
Informant 11	building, train, water	peaceful, calmer	undeveloped area	less activities		nice view		less proximity to store
Informant 12	scenery, ducks	nice, peaceful	foot traffic	noisy		entire lake view		bad view
Informant 13	view of the waterfront	peaceful, quiet, pretty	constructions	distract		familiar		distracting
Informant 14	lake	relaxing	smell, big event	frustrating		relax		dirty, dusty
Informant 15	lake, walking trail	smoothing, calm	boundary	wish to be round		kids enjoy		noisy
Informant 16	reflection of the building on the water	beautiful, soothing, calm, attractive, peaceful,	no walk-in to the water	cannot enjoy the water		See entire lake		not good view
Informant 17	lights, flowing water	familiar	sycamore trees	nasty		friendly, safe	no	no
Informant 18	walkway	enjoy the exercise,	no	no		feels like neighborhood	no	no
Informant 19	grass, benches, animal	relaxing	run off, water	dirty		calm		dirty, distract

Table 4-4 Continue

Informant No.	Most favorite water Characteristics	why	Least favorite water Characteristics	why	Accessibility	Improvement	Addition
Informant 1	movement, ducks	beautiful	No swimming, fishing	more activities	great	No	Gondolas
Informant 2	movement, ducks	beautiful	trash at the corner	terrified	motivated	clean the trash	therapeutic, introspective
Informant 3	view	beautiful	color	dirty	excellent, easy	more retail	Bridge over the lake
Informant 4	walkways under bridge	nice view	trash in the water	dirty	great	no	near work, to be on water
Informant 5	no boats, birds, no wild water activities	calm, peaceful, natural	color	dirty	easy	landscape, more trees, walkways	no
Informant 6	movement, reflection of the sun	cool, interesting	smell	feel bad	good	clear water, swim	beautiful
Informant 7	size, canal	enjoy	nothing around the water	nothing to look at	convenience	build more things to enjoy	no
Informant 8	waterfall, sound	nice, enjoy	dirty things under the bridge	distract	easy	yes	no

Informant 9	ducks	peaceful, quite	color	dirty	enjoy	yes	no
Informant 10	sound	relaxing	trash	dirty	pedestrian-friendly	no	no
Informant 11	birds	enjoy	no	no	good	no	no
Informant 12	movement	peaceful	flood, trash, color	fear, dirty	like it	water quality	no
Informant 13	animal, sound	familiar	flood, trash	distract	easy	no	no
Informant 14	ducks, fishes	alive	color	not clean enough	good	dog park, more retail, place to hang out	jump and swim
Informant 15	movement	no reason	color	not clear	enjoy	swim, fishing	no
Informant 16	movement	pretty	color	dark, dirty	good	sidewalk	retail
Informant 17	movement	familiar	no	no	easy	more benches	no
Informant 18	movement	natural	trash, refill	dirty	good	complete the walkway	no
Informant 19	water itself	peaceful, flat, clear	color	mossy	easy	trash	no

4.5 Themes from the Findings

Based on the analysis of the interview data in the previous section, the key perceptions of the landscaps design characteristics are classified into five categories: enjoyment, variety, quality, identifiability, and convenience.

4.5.1 Enjoyment

Enjoyment is found to be the most important measurement for the waterfront landscape characteristics in this research. During the interviews with the participants, most report that they enjoy the landscapes in the Las Colinas Urban Center, they love the beautiful scenery of the landscapes, and they feel peaceful when they walk or exercise there. In addition, some of the informants also love the view of the entire lake from the southern end of the lake. Beautiful and peaceful are two words that the participants of this research most often use to describe their perceptions of the waterfront landscapes. In addtition, other words used by the participants to describe their feelings are quite, clean, relaxing, soothing, therapeutic, calm, attractive, friendly, and attractive. All of these words point to the enjoyment of the waterfront landscapes in the Las Colinas Urban Center. Indeed, two of the informants (I-1 & I-2) say they visit the waterfront when they are in a bad mood. For them, the waterfront is enjoyable because it is therapeutic and provides them a convenient and comfortable place to think about life and relax.

4.5.2 Variety

According to the findings from the interview data, increased variety is what the participants of this research hope for in the future development of the Las Colinas Urban Center. Variety refers to different types of retail, open spaces, or activity areas for residents and their families, friends, and pets. Many of the participants say they would like to spend time with friends in coffee shops and other places. Therefore, more retail, especially restaurants, at the Las Colinas Urban Center is the desire of many of the particpants. In addition to eating with in places that afford beautiful views, the participants in this research report they also like to exercise around the areas of the waterfront they find most visually appealing. Open spaces,

especially a dog park, is another element or feature that participants hope to have at the Las Colinas Urban Center. In addition, more activity areas for exercise, picnicing, or gathering are desired by the participants of this study.

In conclusion, except the existing trail system and few gathering areas, more retails, activity areas, and open spaces are needed in the waterfront landscapes at the Las Colinas Urban Center so as to attract more residents and increase their happiness.

4.5.3 Quality

The quality of the water is another key point of the participant's perceptions as noted in the interview data. According to Faggi et al. (2013), people value color more than any other characteristic. Many of the partipcants report that the quality of the water is poor, especially the color of the water and the trash in the water. The color of the water is grey green, unclear, and slightly dirty looking, making it difficult to see what happens in the water. Moreover, with the trash that collects in the corner of the lake, people think the lake is not clean and are unhappy with it. In addition, during stormy weather, informant (I-6) reports that the water smells like dead fish.

In sum, most of the participants want cleaner, clearer, and more blue colored water in the future. Some of the participants also want to swim or fish in the water if it improves in quality.

4.5.4 Identifiability

According to Herzog (1985), identifiability refers to the sense of familiarity. Also Faggi et al. (2013) say that people around coastal areas perceive water with the feeling of familiarity. From the interview data of this research, many of the participants also point out that they prefer the water or the lake because of its identifiability or familiarity, especially the ones from costal areas. For example, informant (I-2) is from the costal area of California and feel familiar when she visits the waterfront in the Las Colinas Urban Center. In addition, informant (I-17) believes that water is his nature. Thus, the participants prefer the water because of the familiarity of it with where they were raised or have lived for many years.

4.5.5 Convenience

Convenience is the last key point identified from the interview data. All of the participants give positive answers to the value of the accessibility to the waterfront landscapes at the Las Colinas Urban Center. They report that it is easy, convenient, pedestrian-friendly, and very enjoyable. The residence and the pool areas are well connected to the waterfront. Some of the participants are directly in the waterfront when they walk out the front doors of their residences. Many of the participants also have visual access to the water from their residences, which allows them to enjoy the waterfront with a different persepective than from the waterfront itself. Finally, the access of the waterfront is highly convenient for the residents who live in the Las Colinas Urban Center.

4.6 Summary

This chapter of analysis and findings starts with the analysis of the interview data. The basic demographic information of the participants and their profile question are summarized in the following sections. Next, the participants' perceptions of the elements and features, water characteristics, and accessibility are analized by this researcher, and areas of improvement and additional information from the informants is presented. In the passive observation section, photographs are used to highlight the different landscape design characteristics of the waterfront landscapes in the Las Colinas Urban Center. After this, the interview data is summarized in bar charts and analyzed in text. Finally, this chapter concludes by identifying themes from the interview data taken from key words from the perceptions of the participants. The next chapter covers the conclusions of this research.

CHAPTER 5

CONCLUSIONS

5.1 Introduction

After analyzing the data in Chapter 4, this researcher identifies the landscape design characteristics of the waterfront landscapes in Las Colinas Urban Center. This Chapter analyzes these characteristics along with the perceptions of the residents living in or near the Urban Center, presents the conclusions, explores the relevance of this research to the profession of landscape architecture, and finishes with a discussion of the areas of future research.

5.2 Summary of Findings

Four research questions have been raised in the first chapter:

1. What are the residents' perceptions of the landscape design characteristics, specifically the elements and features of waterfront landscapes of the Las Colinas Urban Center, Irving, Texas?
2. What are the residents' perceptions of the water characteristics of the Las Colinas Urban Center, Irving, Texas?
3. What are the residents' perceptions of the accessibility to the water and waterfront landscapes in the Las Colinas Urban Center, Irving, Texas?
4. How does this information help landscape architects improve the future design of waterfront landscapes in a man-made environment?

In this section, a summary of the data and findings for these four questions from the interviews is presented, as well as the overall conclusions from the literature reviews. Various themes identified from key words in the interview findings are used in this secion to help this researcher more completely respond to the research questions.

5.2.1 What are the Residents' Perceptions of Elements and Features?

In order to understand residents' perceptions of the elements and features of the waterfront landscapes in the Las Colinas Urban Center, four questions are asked by this researcher during the interview. Based on the findings in Chapter 4, the participants mostly enjoy the lake of the waterfront landscape. People prefer the natural elements and features in man-made waterfront landscapes. At the same time, residents dislike the bad quality of the water. In addition, the parts of the pathway that have broken brick surfaces are viewed as dangerous and therefore also least preferred by most of the participants in this research.

According to the analysis and findings from Chapter 4, most of the participants in this study report that the waterfront landscapes in the Las Colinas Urban Center are enjoyable, yet they still hope to be in close proximity to various retail and activity areas. The participants enjoy the waterfronts because they are calm, beautiful, quiet, relaxing, soothing, attractive, unique, peaceful, and seem alive. Some of the participants' negative perceptions of the elements and features of the waterfront landscapes include that they can be noisy, smell bad, dangerous, dirty, old, frustrating, nasty, and dusty .

5.2.2 What are the Residents' Perceptions of Water Characteristics?

Two questions asked during the interviews to better understand the residents' perceptions of the water characteristics in the Las Colinas Urban Center. Movement of the water is most preferred by the participants of this research. At the same time, the participants express their dislike of the poor quality of the water, especially the dark color of the water and the trash in the corner of the lake.

According to the interview data, the quality of and the identifiability to the water are key perceptions of the participants in this research. The participants expect improved quality of the water; as reported by many of them, the dark and dirty water color and the accumulated trash in the corner Lake Carolyn is unenjoyable and distracting. However, other particpants prefer the water because they are familiar with the waters of waterfront landscapes. For example, they

may have been raised in an oceanfront city or have lived in another type of waterfront area for a long time before moving to the Las Colinas Urban Center.

5.2.3 What are the Residents' Perceptions of Accessibility?

According to the interview data, the accessibility of the residents to the waterfronts in the Las Colinas Urban Center is strongly preferred. In fact, all nineteen of the participants provided positive responses when asked about accessibility. All of them reports that the access of the waterfront landscapes is convenient, easy, and comfortable. During the interviews, many of the participants who both live and work in the Las Colinas Urban Center highly evaluate and enjoy its accessibility. From the overall research findings, only a few minor impediments to accessibility are identified: the quality of pavement for walkability, the limited parking for visitors' vehicles, and the limited access to trails that in some instances are not as friendly for mutli-modal use, such as biking, walking, and/or hiking.

5.2.4 How does this information help landscape architects improve the future design of waterfront landscapes?

According to the findings in Chapter 4, the participants of this study specifically point out that five areas that need improvement at the Las Colinas Urban Center: increased development, decreased trash, improved water quality, more opportunity for activities, and more benches and other seating areas. These five elements are discussed by the participants when asked about their least favorite elements and featuress, and least favorite water characteristics. Moreover, if the waterfront landscapes are better maintained and if more spaces for activities such as restaurants or dog parks are provided, the participants in this study suggest they will enjoy their surroundings more and may even live at the Las Colinas Urban Center longer. In addition, the design characteristics of the waterfront that received the most positive feedback from the participants, such as the water, urban forms, the vegetation, the trail, anbd the natural characteristics of the water, should have increased focus and attention during the design process. Landscape architects should take consideration during future design processes not

only these five improvement suggestions but also the negative design characteristics discussed by the participants such as the maintenance of the landscapes, flood control, and activity management during large events. Understanding the in-depth responses of the participants' perceptions of the watefront landscapes in the Las Colinas Urban Center has the potential to help landscape architects enhance design in the future and create an improved living environment in waterfront areas.

5.3 Conclusions & Discussion

The purpose of this research is to assess the residents' perceptions of the waterfront landscapes. It is found that there are five main themes that influence the perceptions of the participants in this research: enjoyment, variety, quality, identifiability, and convenience. According to the analysis of the findings in Chapter 4, water is the most important landscape design characteristic, and this relates to all the five themes. In addition, accessibility, both visual and physical, is an important design characteristic for residents when they are looking for a place to live.

Furthermore, five improvement suggestions for the future design and maintanence of waterfront landscapes that may help landscape architects create a better living environment are identified: more benches, increased opportunity for activities, enhanced development, improved water quality, and decreased trash in the water. In addition, with all of these efforts by developers and designers, residents will have an improved living experience with the waterfront landscapes near their residences, especially at the Las Colinas Urban Center.

It can be concluded from this research that landscape design characteristics do have an influence on residents' decisions concerning where they choose to live. For example, the more visual access they have from their residences to the water, the higher prices they are willing to pay for their rent. Also, if the landscapes and water have improved maintenance, the residents may enjoy an improved quality of life.

5.4 Relevance to the Profession of Landscape Architecture

According to the details discussed in Chapters one and two, the waterfront landscapes in the Las Colinas Urban Center do have the protential to have increased development in the future. Moreover, at the time of this research, several projects are under construction around the waterfront areas of the study site. In addition, the residents' perceptions may help the landscape architects and developers create an improved living situation for the existing and future potential residents. Therefore, this reseach provides important design and maintenance suggestions for waterfront landscapes in the Las Colinas' related projects to landscape architects. Furthermore, this research also provides suggestions for the future deisgn of man-made waterfront landscapes to landscape architects, for example, by exploring how to create an improved waterfront residential development that may attract more residents. Finally, understanding the design elements, features, and characteristics of both landscapes and water, as well as understanding accessibility to such sites, are critical factors for landscape architects to consider when designing waterfront developments.

5.5 Future Research

With the finding and conclusions of this research, several recommendations for future study are made. Answers to the following questions in the future may provide important information about how to improve the design of waterfront landscapes:

- How can other stakeholder, employer, visitor, and/or designer perceptions be used to improve the design of the waterfront landscapes in the Las Colinas Urban Center?
- What is the economic value of waterfront landscapes?
- What is the social value of waterfront landscapes?
- How can future researchers best use the findings from multiple case studies to draw a comprehensive set of factors and provide more generalizable outcomes?

APPENDIX A

IRB APPROVAL LETTER

UNIVERSITY OF TEXAS ARLINGTON | OFFICE OF RESEARCH ADMINISTRATION
REGULATORY SERVICES

Institutional Review Board
Notification of Exemption

February 24, 2016

Xiaolu Ma
Dr. Taner R. Ozdil
Architecture
Box 19108

Protocol Number: 2016-0406

Protocol Title: *Assessing Residents' Perceptions of Waterfront Landscapes in Las Colinas Urban Center, Irving, Texas*

EXEMPTION DETERMINATION

The UT Arlington Institutional Review Board (IRB) Chair, or designee, has reviewed the above referenced study and found that it qualified for exemption under the federal guidelines for the protection of human subjects as referenced at Title 45CFR Part 46.101(b)(2).

- (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless:(i) information obtained is recorded in such a manner that human subjects can be identified, either directly or through identifiers linked to the subject; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

You are therefore authorized to begin the research as of **February 23, 2016**.

Pursuant to Title 45 CFR 46.103(b)(4)(iii), investigators are required to, "promptly report to the IRB ***any*** proposed changes in the research activity, and to ensure that such changes in approved research, during the period for which IRB approval has already been given, are **not initiated without prior IRB review and approval** except when necessary to eliminate apparent immediate hazards to the subject." All proposed changes to the research must be submitted via the electronic submission system prior to implementation. Please also be advised that as the principal investigator, you are required to report local adverse (unanticipated) events to the Office of Research Administration; Regulatory Services within 24 hours of the occurrence or upon acknowledgement of the occurrence. All investigators and key personnel identified in the protocol must have documented Human Subject Protection (HSP) Training on file with this office. Completion certificates are valid for 2 years from completion date.

The UT Arlington Office of Research Administration; Regulatory Services appreciates your continuing commitment to the protection of human research subjects. Should you have questions or require further assistance, please contact Regulatory Services at regulatoryservices@uta.edu or 817-272-2105.

APPENDIX B

INFORMED CONSENT DOCUMENT

UT Arlington
Informed Consent Document

PRINCIPAL INVESTIGATOR
Xiaolu Ma
Program in Landscape Architecture
College of Architecture, Planning and Public Affairs
Email: xiaolu.ma@mavs.uta.edu
Phone: 817.908.0585

FACULTY ADVISOR
Dr. Taner R. Ozdil
Program in Landscape Architecture
College of Architecture, Planning and Public Affairs
Email: tozdil@uta.edu

TITLE OF PROJECT
Assessing Residents' Perceptions of Waterfront Landscapes in Las Colinas Urban Center, Irving, Texas

INTRODUCTION
You are being asked to participate in a research study about your perception of living around waterfront landscape. You are being selected because you have used, have knowledge of or live in the Las Colinas Urban Center, Irving, Texas. Participation is in the form of interview questions. Your participation is voluntary. Refusal to participate or discontinuing your participation at any time will involve no penalty or loss of benefits to which you are otherwise entitled. Please ask questions if there is anything you do not understand. This research will be compiled into a thesis format and is the final step towards earning my degree at the University of Texas at Arlington. Thank you so much for your time and consideration.

PURPOSE
The purpose of this study is to assess the residents' perceptions of the waterfront landscapes in manmade environments. Through passive observations and in-depth interviews, this research specifically focuses on the perception of residents of landscape design characteristics and features of waterfront landscapes in Las Colinas Urban Center, Irving, Texas. Informed by the literature review the research primarily focuses on residents' preferences and the assessment of landscape elements and features, accessibility, and water characteristics in such waterfront landscapes.

DURATION
Participation in this study will last approximately 25 minutes.

NUMBER OF PARTICIPANTS
The number of anticipated participants in this research study is 50 adults.

IRB Approval Date: FEB 23 2016

UT Arlington
Informed Consent Document

PROCEDURES
The procedures, which will involve you as a research participant, include:

1. You will read the UT Arlington Informed Consent Document
2. You will be verbally asked whether you would like to participate
3. A map will be provided to you to mark on it
4. You will be asked interview questions which were prepared by the researcher Questions will be about design features, water characteristics, and accessibility of the waterfront landscape in Las Colinas Urban Center, Irving, Texas

The interview will be audio recorded. After the interview, the tape will be transcribed, which means they will be typed exactly as they were recorded, word-by-word. The tape and transcription will only be used for the thesis study as well as any follow up scholarly publications and/or presentations by the researchers. .

POSSIBLE BENEFITS
Participants would not be directly benefitted from this research. This research does have the possibility of benefitting fields such as landscape architecture, residential developers, and city design. Indirectly, this study would potentially benefit the residents and the City of Irving.

POSSIBLE RISKS/DISCOMFORTS
There are no perceived risks or discomforts for participating in this research study. Should you experience any discomfort please inform the researcher, you have the right to quit any study procedures at any time at no consequence.

COMPENSATION
There will be no compensation for participation in this study.

ALTERNATIVE PROCEDURES
There are no alternative procedures offered for this study. However, you can elect not to participate in the study or quit at any time at no consequence.

VOLUNTARY PARTICIPATION
Participation in this research study is voluntary. You have the right to decline participation in any or all study procedures or quit at any time at no consequence.

CONFIDENTIALITY
Every attempt will be made to see that your study results are kept confidential. A copy of the consent form and all data collected including transcriptions/tapes if applicable from this study will be stored in Architecture Building Room # 417, the office of Dr. Taner R. Ozdil, for at least three (3) years after the end of this research. The results of this study may be published and/or presented at meetings without naming you as a participant. Additional research studies could evolve from the information you have provided, but

IRB Approval Date: FEB 2 3 2016

your information will not be linked to you in anyway; it will be anonymous. Although your rights and privacy will be maintained, the Secretary of the Department of Health and Human Services, the UTA Institutional Review Board (IRB), and personnel particular to this research have access to the study records. Your records will be kept completely confidential according to current legal requirements. They will not be revealed unless required by law, or as noted above. The IRB at UTA has reviewed and approved this study and the information within this consent form. If in the unlikely event it becomes necessary for the Institutional Review Board to review your research records, the University of Texas at Arlington will protect the confidentiality of those records to the extent permitted by law.

CONTACT FOR QUESTIONS

Questions about this research study may be directed to me Xiaolu Ma or my faculty advisor, Dr. Taner R. Ozdil. Phone numbers and emails are listed below. Any questions you may have about your rights as a research participant or a research-related injury may be directed to the Office of Research Administration; Regulatory Services at 817-272-2105 or regulatoryservices@uta.edu.

Xiaolu Ma
Phone: 817-908-0585
Email: xiaolu.ma@mavs.uta.edu

Dr. Taner R. Ozdil
Phone: 817.272.5089
Email: tozdil@uta.edu

As a representative of this study, I have explained the purpose, the procedures, the benefits, and the risks that are involved in this research study:

Xiaolu Ma
Signature and printed name of principal investigator or person obtaining consent **Date**

CONSENT

By verbally agree to participate, you confirm that you are 18 years of age or older and have read or had this document read to you. You have been informed about this study's purpose, procedures, possible benefits and risks, and you have received a copy of this form. You have been given the opportunity to ask questions before you verbally agreeing to participate, and you have been told that you can ask other questions at any time.

You voluntarily agree to participate in this study. By verbally agreeing to participate in this study, you are not waiving any of your legal rights. Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may discontinue

IRB Approval Date: FEB 2 3 2016

participation at any time without penalty or loss of benefits, to which you are otherwise entitled.

IRB Approval Date: FEB 2 3 2016

APPENDIX C

RECRUITMENT LETTLE

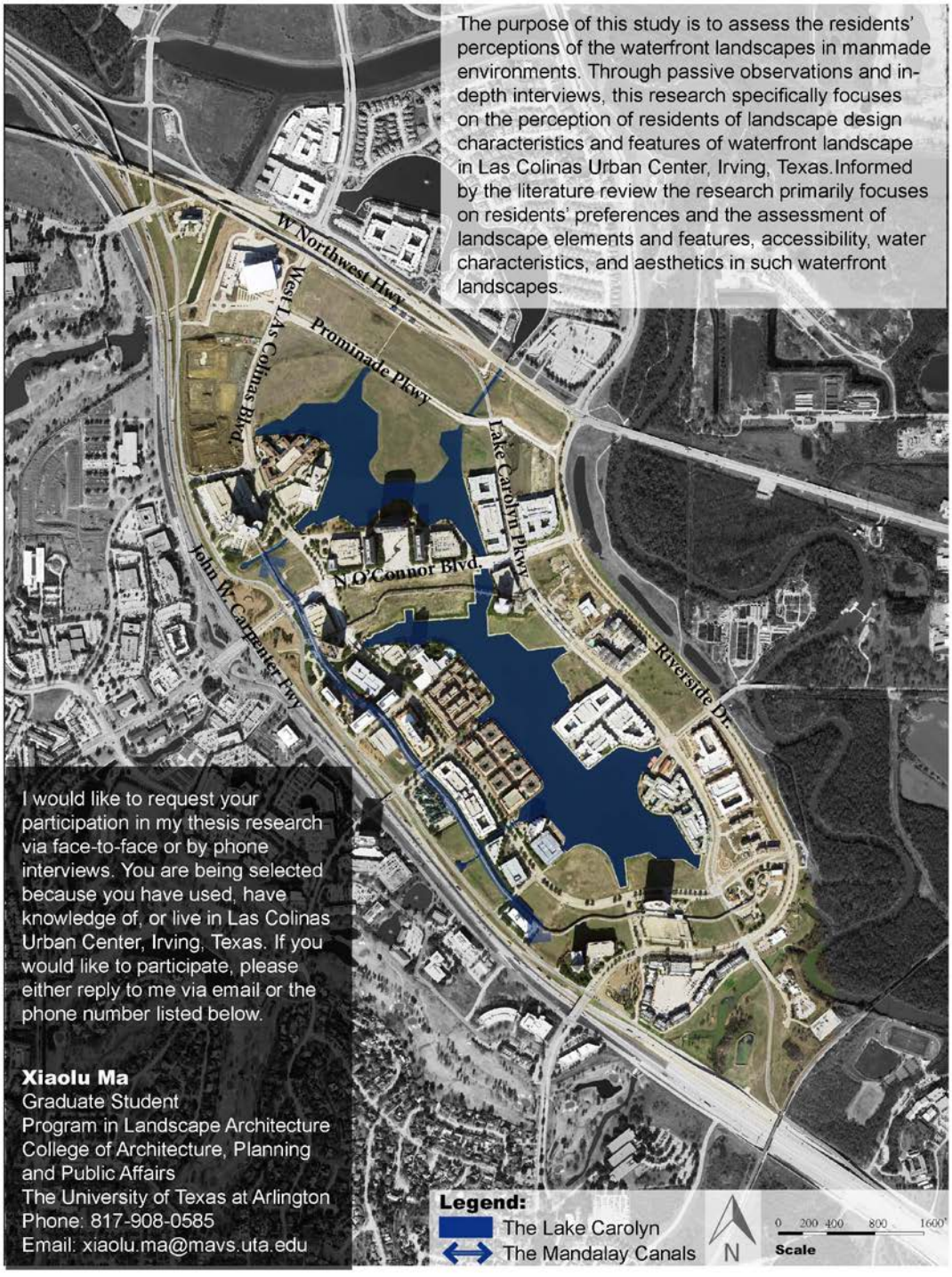
Email/Phone/Letter Script Recruitment (May also be used as a flyer for recruitment)

Dear Mr. / Ms.
My name is Xiaolu Ma and I am a graduate student in the Master's Program in Landscape Architecture at the University of Texas at Arlington. I am conducting research for my Master's thesis titled: **Assessing Residents' Perceptions of Waterfront Landscapes in Las Colinas Urban Center, Irving, Texas**.
I would like to request you and/or your residents' participation in my thesis research via face-to-face or by phone interviews. You are being selected because you have used, have knowledge of, or live in Las Colinas Urban Center, Irving, Texas. The primary goal of this research study is to assess waterfront landscapes design characteristics that influence the residents' perceptions of their living environment in Las Colinas Urban Center, Irving, Texas.
If you would like to participate, please either reply to me via email or the phone number listed below. Before agreeing to participate you will read an Informed Consent Form either through email or in person. The ICD form will explain the study in further detail. Participation in the study is completely voluntary. If you know of anyone who is interested in participating in this interview, please do let me know how to best to contact him or her.
Thank you very much for your consideration. Your time, support, and participation will be an invaluable part of my research and greatly appreciated.

Sincerely,
Xiaolu Ma
Graduate Student
Program in Landscape Architecture
College of Architecture, Planning and Public Affairs
The University of Texas at Arlington
Phone: 817-908-0585
Email: xiaolu.ma@mavs.uta.edu

APPENDIX D

FLYER



Assessing Residents' Perceptions of Waterfront Landscapes in Las Colinas Urban Center, Irving, Texas

APPENDIX E

INTERVIEW QUESTIONS

Part I: Resident Profile Questions:

- What is your gender?
- What is your age group? (Feel free to indicate your age or indicate you are Young Adult, Adult, or Senior, etc.)
- Do you have minor/kid(s) in your household requiring parental supervision?
- Do you have pet(s) requiring outdoor activity?

- Are you a resident living in Las Colinas Urban Center, Texas? (Las Colinas Urban Center is depicted in the map which surrounded by W Northwest highway, John W. Carpenter freeway, and the riverfront drive)
- How long have you been living within this waterfront community?
- Have you ever lived in waterfront community before Las Colinas, Texas? If so how long have you lived there?
- Did the availability of waterfront landscapes influence your decision to live in Las Colinas Urban Center, Texas?
- How far is your residence to the nearest waterfront in Las Colinas Urban Center, Texas? (i.e. walking distance ¼ mile, couple blocks etc.)
- Do you have visual access to water from your residence?
- How often do you visit waterfront in Las Colinas Urban Center, Texas? (Daily, Weekly, Monthly, Several times in a week, One time, and etc.)

Part II: Waterfront Landscape In-depth Questions

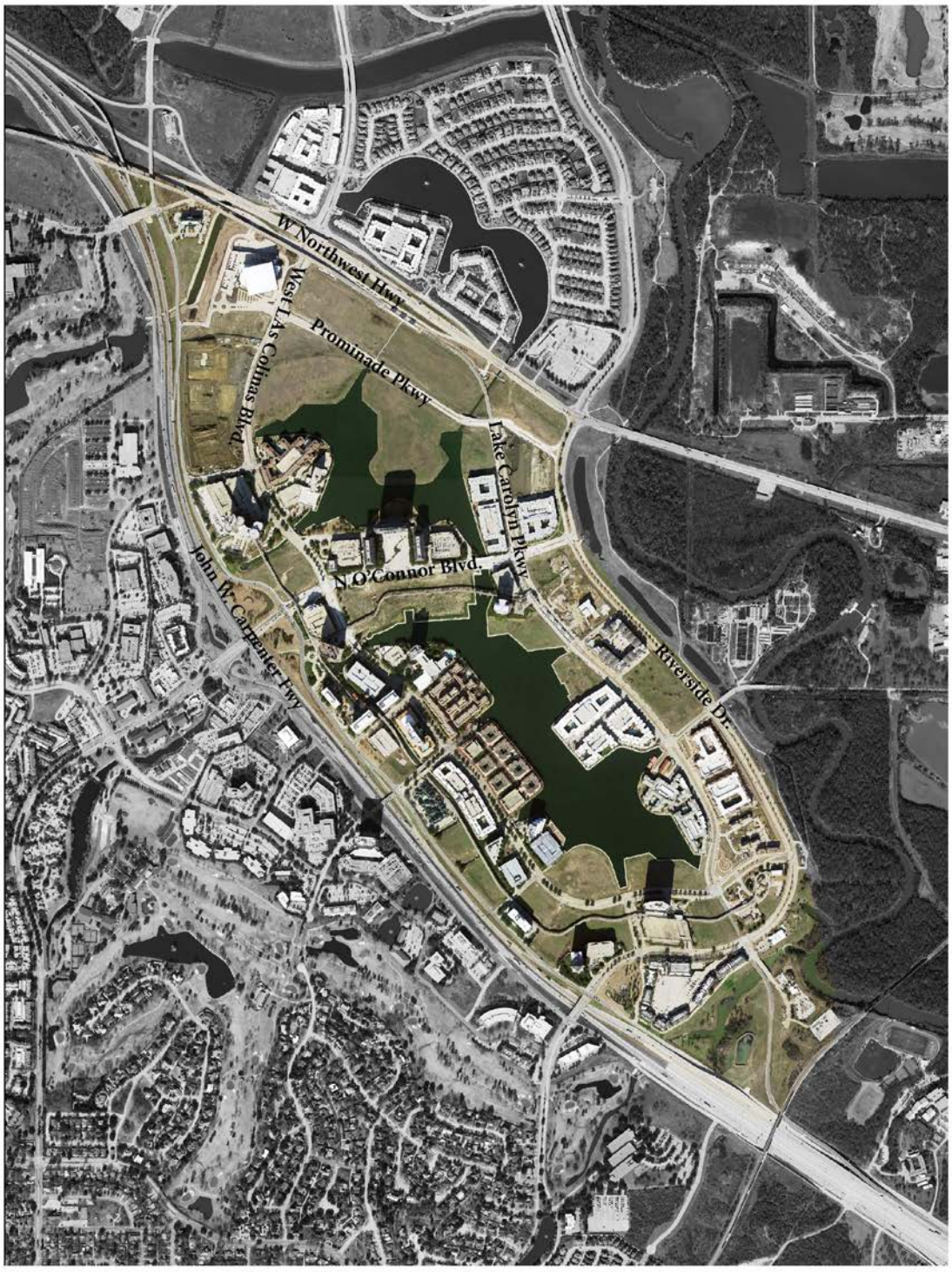
- What are your most favorite landscape elements and features in waterfront landscapes in Las Colinas Urban Center? Why? (Elements and features may refer to seating,

greenery, lighting, bridges, overhead structures, sculptures, bridges, maintenance, trees, and etc.).

- What are your least favorite landscape elements and features in waterfront landscapes in Las Colinas Urban Center? Why? (Elements and features may refer to seating, greenery, lighting, bridges, overhead structures, sculptures, bridges, maintenance, trees, and etc.).
- What is your most favorite area in waterfront landscapes in Las Colinas Urban Center? Why? (Feel free to also illustrate the areas on the map. Please feel free to indicate more than one area).
- What is your least favorite area in waterfront landscapes in Las Colinas Urban Center, Texas? Why? (Feel free to also illustrate the areas on the map. Please feel free to indicate more than one area).
- What characteristics of water in Las Colinas Urban Center you favor the most? (Such as color, sound, shape, movement, spaciousness, and etc.)
- What characteristics of water in Las Colinas Urban Center you favor the least? (Such as color, sound, shape, movement, spaciousness, and etc.)
- How do you feel about your visual or physical access to waterfront landscapes in Las Colinas Urban Center, Texas? Please elaborate(i.e. are there impediments for your connectivity to water or waterfront)
- Do you think the waterfront landscapes needs to be improved in Las Colinas Urban Center, Texas? If so how?
- Is there anything you want to add?

APPENDIX F

MAP OF WATERFRONT LANDSCAPES



Map of Las Colinas Urban Center, Irving,Texas

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BIOGRAPHICAL INFORMATION

Xiaolu Ma holds a Bachelor's Degree in Agronomy from China Agricultural University in China and now Master's Degree in Landscape Architecture from The University of Texas at Arlington. Professionally, Ma worked for different firms as an intern during academic years. These experiences makes Ma have the passion and interests in urban design and low impact development in landscape architecture projects.

Ma participated in the university by 2013 fall. During three years study, she also got student design awards and scholarships. These awards include two merit awards from the Texas ASLA for student design submissions, one student merit award from Texas ASLA and also Richard B. Myrick scholarship for every academic year.

For future plan, Ma decides to continue working in landscape architecture field and seeking for next peak for her career life.