

DESIGNERS' PERSPECTIVES OF WALKABILITY AND ACCESSIBILITY
OF DART'S DOWNTOWN TRANSITWAY MALL
IN DALLAS, TEXAS

by

VAIDEHI NITEEN GUPTE

Presented to the Faculty of the Graduate School of
The University of Texas at Arlington in Partial Fulfillment
of the Requirements
for the Degree of

MASTER OF LANDSCAPE ARCHITECTURE

THE UNIVERSITY OF TEXAS AT ARLINGTON

DECEMBER 2009

Copyright © by Vaidehi Gupte 2009

All Rights Reserved

ACKNOWLEDGEMENTS

I am sincerely appreciative to Dr. Taner R. Ozdil, my thesis chair, for his guidance and encouragement through this entire thesis process. I would like to express my appreciation for Dr. Pat D. Taylor and Assistant Professor David Hopman for their time and valuable contributions to this thesis. I am grateful to all the faculty members and adjunct professors in the Program of Landscape Architecture, who have augmented my acquaintance with landscape architecture through knowledge-imparting coursework. Special thanks to Tracey-Lynn Clough for her editorial contributions to my thesis. I would also like to thank all the design professionals who completed my walkthrough surveys.

I am extremely grateful to my close friends and classmates for their invaluable suggestions and support. My deepest gratitude is extended to my grandmother, my parents, my in-laws and my brother. I would like to specially thank my husband who has always encouraged me to excel and pursue my dreams, and has helped and supported me throughout the master's program.

November 20, 2009

ABSTRACT

DESIGNERS' PERSPECTIVES OF WALKABILITY AND ACCESSIBILITY OF DART'S DOWNTOWN TRANSITWAY MALL IN DALLAS, TEXAS

Vaidehi Niteen Gupte, MLA

The University of Texas at Arlington, 2009

Supervising Professor: Taner R. Ozdil

Quality urban spaces, including plazas and pedestrian malls, encourage use of the Central Business District (CBD) and stimulate a vibrant atmosphere for casual strolling, window-shopping, and browsing (Rubenstein, 1992). Dallas, which defines the term “automobile city” in many people’s minds, began developing and implementing a visionary plan in the early 1990s for light rail as a tool for economic growth and community development. The city’s Dallas Area Rapid Transit (DART) starter system of light rail opened in June 1996, and the city that grew up with the automobile began to embrace transit as an integral part of its future (Garrick, 2000). DART further developed a downtown transitway mall in 1996 within the CBD to enhance the economic vitality and aesthetics of the area.

A transit mall consists of the removal of automobile and truck traffic from an existing principal retail street and allowing only public transit such as buses or light rail. The mall becomes a retail spine or corridor through the central business district. (Rubenstein, 1992). The DART transitway mall was designed to reenergize downtown Dallas as a center where people work, reside, or come for recreation, culture, and shopping. Since the implementation of the transitway mall, a limited number of studies have addressed the design of the mall as a pedestrian district (North Central Texas Council of Government [NCTCOG] 2003).

The objective of this research is to evaluate design elements of the downtown transitway mall and study their impacts on walkability and accessibility within the mall. Research began with a comprehensive literature review to determine what design elements affect walkability and accessibility of an urban environment. A combination of passive observation techniques, walkthrough surveys with design professionals, and analysis of the Regional Mobility Initiatives data (NCTCOG, 2003). were utilized to evaluate the walkability and accessibility of the transitway mall. The findings from these three methods were analyzed using data triangulation.

Results of the study indicate that certain design elements impact the walkability and accessibility of the transitway mall in regard to accessibility and the walking experience of pedestrians. This research can guide landscape architects and other design professionals in their future design projects to create walkable and accessible urban spaces for pedestrians.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS.....	iii
ABSTRACT	iv
LIST OF ILLUSTRATIONS.....	xi
LIST OF TABLES.....	xv
Chapter	Page
1. INTRODUCTION.....	1
1.1 Background of the Study	1
1.2 Walkability and Accessibility	2
1.3 The Downtown Transitway Mall.....	3
1.4 Design Elements	6
1.5 Purpose of the Study	6
1.6 Research Questions.....	7
1.7 Methodology.....	7
1.8 Definitions	9
1.9 Significance and Limitations	16
1.10 Chapter Summary	18
2. LITERATURE REVIEW	21
2.1 Walkability and Accessibility in Design Literature.....	21

2.1.1 Walkability	22
2.1.2 Accessibility	26
2.2 Design Elements of Urban Spaces.....	28
2.2.1 Matrix of the Design Elements	29
2.3 Concept of Malls in Design Literature	32
2.4 The Downtown Transitway Mall.....	34
2.4.1 Contextual Timeline	36
2.5 Chapter Summary	40
3. RESEARCH METHODS	41
3.1 Site Selection and Application.....	41
3.2 Data Collection	43
3.2.1 Regional Mobility Initiatives Data	45
3.2.2 Walkthrough Survey.....	47
3.2.3 Passive Observation.....	48
3.2.4 Data Triangulation	50
3.3 Summary of Research Methods.....	51
4. RESEARCH ANALYSIS AND FINDINGS	53
4.1 Overview of Research Methods.....	53
4.2 Survey Findings.....	54
4.2.1 Profile Information	54
4.2.2 Open-ended Questions.....	56
4.3 Analysis of the Walkability and Accessibility Data	59

4.3.1 Vegetation.....	60
4.3.2 Food Sources	62
4.3.3 People	65
4.3.4 Art-work	67
4.3.5 Water features.....	69
4.3.6 Signage	71
4.3.7 Lighting.....	73
4.3.8 Surface Material.....	74
4.3.9 Seating	78
4.3.10 Street Furniture	81
4.3.11 Platforms.....	83
4.3.12 Fenestration.....	85
4.3.13 Store Windows.....	88
4.3.14 Scale and Proportion.....	89
4.3.15 Canopies and Awnings	91
4.3.16 Curb-cuts and Ramps.....	92
4.3.17 Maintenance.....	94
4.3.18 Open-ended Questions.....	96
4.4 Overview of the Research Findings.....	97
4.5 Chapter Summary	104
5. CONCLUSION.....	106
5.1 Conclusions.....	106

5.2 Lessons Learned from the Transitway Mall	107
5.3 Suggestions for the Transitway Mall.....	110
5.4 Value of the Study to Landscape Architects.....	111
5.5 Future Research	112
APPENDIX	
A. PASSIVE OBSERVATION DATA.....	113
B. SURVEY QUESTIONNAIRE SAMPLE PAGES	118
C. SURVEY DATA.....	125
REFERENCES	132
BIOGRAPHICAL INFORMATION.....	137

LIST OF ILLUSTRATIONS

Figure	Page
1.1 DART System Rail Map.....	4
1.2 Transitway Mall in Downtown Dallas.....	5
1.3 Dallas Downtown District Map.....	11
2.1 16 th Street Transit Mall in Denver, Colorado	33
2.2 Concept Plan for the Transitway Mall.....	34
2.3 Downtown Transitway Mall-West End Station.....	35
2.4 DART Transitway Mall.....	38
3.1 Light Rail Route in Downtown Dallas	43
3.2 Graphic Representation of Transitway Mall Segments	45
3.3 Design Elements at the Transitway Mall.....	49
3.4 Relationship between Data Triangulation and the Research Methods	51
4.1 Occupation of the Survey Participants	55
4.2 Importance of the Design Features of Transit Malls	56
4.3 Survey Participant’s Activities at the Transitway Mall.....	57
4.4 Vegetation in this Segment Provides a Good Walking Experience.	60
4.5 Canopy Trees at West End Station	61
4.6 Vegetation along the St. Paul Segment.....	62
4.7 Food Sources Create a Lively Experience for Pedestrians	63

4.8 A Restaurant at the West End Segment and an Italian Café at the St.Paul Segment ..	64
4.9 Restaurant at the Pearl Segment	64
4.10 Presence of People Creates a Lively Experience for Pedestrians	65
4.11 West End Station at 2 pm on a Weekday	66
4.12 The Cancer Survivors Plaza.....	66
4.13 Presence of Artwork Provides a Good Walking Experience.....	67
4.14 Artwork at the St. Paul Segment.....	68
4.15 Artwork at the Cancer Survivors Plaza	69
4.16 Presence of Water Features Provides a Good Walking Experience	69
4.17 The Wall outside Thanksgiving Square.....	70
4.18 Water Feature beyond the Wall at Thanksgiving Square	70
4.19 There is Enough Informational Signage along this Segment.	71
4.20 Signage at the Transitway Mall	72
4.21 Informational Signage	72
4.22 The Lighting in this Segment is Adequate for Walking after Sunset.	73
4.23 Light Fixtures at the Transitway Mall	74
4.24 Surface Material Along the West End Segment	75
4.25 Efficiency of the Surface Material for Walking	75
4.26 Efficiency of the Surface Material for Wheelchair Navigation.....	76
4.27 Typical Paving at Akard, St. Paul and Pearl Segments	76
4.28 Granite Pavers at Akard Station	77
4.29 Decorative Pavers around Thanksgiving Square.....	77

4.30 Sufficient Seating Spaces	78
4.31 Seating at Pearl Station.....	79
4.32 People Waiting at West End Station.....	79
4.33 Niche above Seating Areas at Pearl Station	80
4.34 Street Furniture Fulfills the Functional Requirements of Pedestrians.....	81
4.35 Street Furniture at Akard Station.....	81
4.36 Trash Can at Akard Station.....	82
4.37 Magazine Dispensers at Akard Station.....	83
4.38 Platforms easily Accommodate Rush Hour Pedestrian Traffic	84
4.39 Fenestration Provides a Good Walking Experience.	85
4.40 Fenestration along the Pearl Segment.....	86
4.41 Fenestration along the West End Segment	86
4.42 Mural Art at the Pearl Segment	87
4.43 Blank Facades along the Akard Segment	87
4.44 Display of Goods in the Store Windows Adds to the Walking Experience	88
4.45 Store Window at the Akard Segment	88
4.46 Scale and Proportion of the Buildings to the Streets	89
4.47 Scale of the Buildings at the St. Paul Segment.....	90
4.48 Scale of the Buildings at the West End Segment	90
4.49 Overhead Structures Provide Adequate Weather Protection in this Segment.	91
4.50 Overhead Structure at West End Station	91
4.51 Curb-cuts and Ramps are Well Designed to Promote Accessibility	92

4.52 Boarding Ramp at Pearl Station	93
4.53 Curb Ramps at the St. Paul Segment	93
4.54 Regional Mobility Initiatives Map Showing Existing Curb Cuts.....	94
4.55 This Segment of the Mall is Well Maintained.....	95
4.56 Maintenance Needed along Akard Segment.....	95
4.57 Overview of Findings of the West End Segment	102
4.58 Overview of Findings of the Akard Segment	103
4.59 Overview of Findings of the St. Paul Segment.....	103
4.60 Overview of Findings of the Pearl Segment.....	104
4.61 Overview of Findings for the Transitway Mall	104
5.1 Transitway Mall Findings for the Six Design Elements.....	108

LIST OF TABLES

Table	Page
2.1 Land-use Benefits of Improved Walkability	25
2.2 Design Literature Review Matrix	30
2.3 Design Literature Review Matrix	31
3.1 Design Elements Matrix	44

CHAPTER 1

INTRODUCTION

“It is difficult to design a place that will not attract people.

What is remarkable is how often this has been achieved.”

William Whyte (Whyte, 2006).

This chapter describes the relationship between design elements and the walkability and accessibility of urban spaces. Questions are raised about this relationship and their corresponding impacts. The background and history of DART’s transitway mall is studied. The purpose of the study and research methodology is defined in this chapter. The significance and limitations of the questions being asked, in the context of the downtown transitway mall, are also discussed. The chapter ends with a summary.

1.1 Background of the Study

Although the amount of time people spent exercising as leisure time activity has remained constant for years, what has dropped is the amount of exercise that people get from their daily activities-in particular from walking or biking for transportation (Scully and Schmitz, 2005). More people would get exercise as part of their daily lives if the built environment supported pedestrians and bikers. Today’s sedentary habits represent a significant lifestyle change that has occurred since the mid-twentieth century. The built environment that has emerged over the past half-century is now designed to be

vehicle oriented. Even residential and commercial districts are vehicle oriented: they offer an abundance of parking and are accessed via wide high speed roadways with little accommodation for pedestrians or bikers (Scully and Schmitz, 2005). Thus, providing walkable and accessible built environments would help people get exercise.

DART's downtown transitway mall is one such built urban environment based on public transportation. DART's starter system of light rail opened in June 1996, and the city of Dallas that grew up with the automobile embraced transit as an integral part of its future (Garrick, 2000). The downtown transitway mall was also developed in 1996 to re-energize downtown Dallas as a center where people work, reside or come for recreational, cultural and shopping purposes. The mall is the earliest and the only examples of a transit mall in Texas. The mall has grown from accommodating 1.4 million passengers initially to 17.5 million passengers in 2005 (Sasaki Associates, 2009). Such a large usage prompts the need to study the transitway mall's walkability and accessibility.

1.2 Walkability and Accessibility

Walkability is determined by three characteristics: quality of the route, quality of the destination, the quality of the area (Moudon et. al, 2006). This research focuses on these three characteristics by studying design elements. The most successful walkable and accessible spaces have design elements that enhance the walking experience of pedestrians (Scully and Schmitz, 2005). Additional factors that must be considered for an enhanced walking experience are convenience, safety, and visual appeal. Pedestrians need to feel safe from crime, traffic, and weather conditions such as hot sun and sudden

storms. Further, the environment must be aesthetically pleasing, stimulating, and varied. A boring walk feels much longer than an interesting one (Scully and Schmitz, 2005). A walkable, accessible space also needs to have a healthy respect for people of all abilities, with appropriate ramps, medians, refuges, driveway crossings, sidewalks on streets as needed, benches, shaded areas, and other basic amenities to make walking feasible and enjoyable for everyone (Burden, 2009).

The pedestrian perception of the surroundings is unique and noteworthy as they experience the elements of an urban environment in ways that passengers in vehicles do not (Newman and Kenworthy, 1999). Urban designers often point to design and perceptual qualities of the urban environment to influence travel choices (Ewing et. al, 2006). A good environmental image gives its possessor an important sense of emotional security (Lynch, 1960). Urban spaces that are attractive to the pedestrians are the product of the right location, a suitable mix of land use and amenities, and design elements that enhance the walking experience.

1.3 The Downtown Transitway Mall

DART was formed in 1983 as a commuter rail, light rail, and bus operator (see Fig 1.1). As the CBD of Dallas continued to increase density and urban complexity, DART initiated the design and construction of a light rail system to help reduce traffic congestion in the downtown business core. The DART light rail was instigated in the 1990s, and the starter phase was completed and opened for public use in June of 1996. The downtown transitway mall was also completed and started operations in June 1996 (DART, 2009).

Sasaki Associates, who assisted DART in the location of the rail corridors and stations in downtown Dallas, also developed the conceptual and final designs for the transitway mall. “City in Motion” is the central theme for the mall and refers to both the transit system and the city’s growth and development (DART, 2005). The transitway mall passes through districts of varying character, ranging from historic brick warehouses in the West End district to the modern office towers in the Pearl Station area. The mall’s design aimed at creating consistency with the use of common forms and elements. It was designed to attract people not only for the purpose of transit but also for retail, dining, and entertainment. Local artists were commissioned to provide identifying features, such as the clocks, for each station, with each station featuring a unique clock (Simo, 1997).

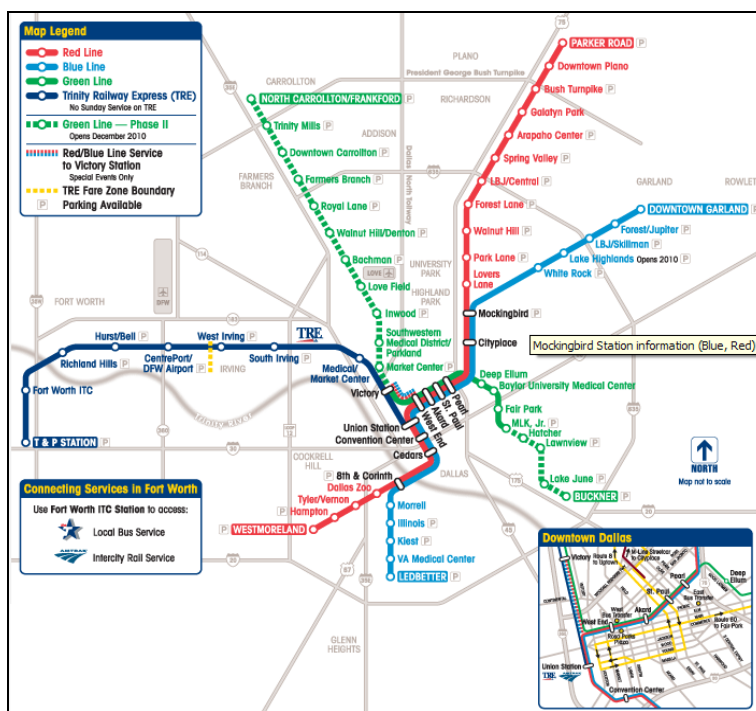


Figure 1.1 DART Rail System Map (DART, 2009)

The downtown transitway mall stretches along Pacific Avenue, from Houston Street in the historic West End, through Thanksgiving Square, and then continues along Bryan Street to Hawkins Street (see Figure 1.2). This 1.2-mile stretch is unified with trees, special streetscape treatments, and a dynamic public arts program. The mall includes four light rail stations—West End, Akard, St. Paul, and Pearl—in the dense business core of downtown Dallas. These stations are common to the red, blue, and green lines of the DART light rail system. These lines share tracks through downtown Dallas, running at grade along streets (DART, 2005).

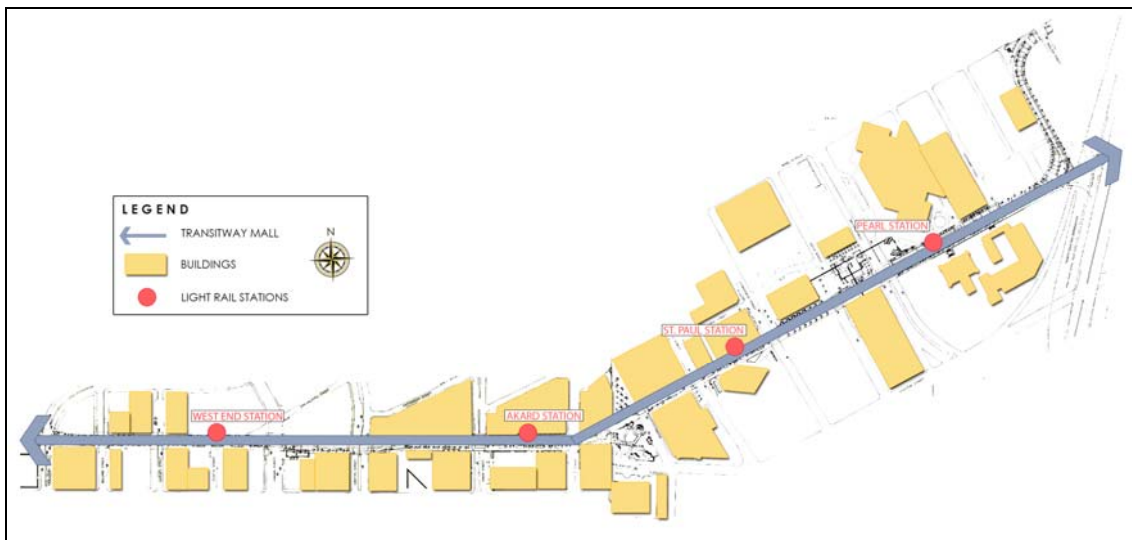


Figure 1.2 Transitway Mall in Downtown Dallas (Base map source: Martin, 1993)

Walking is a critical component of the transportation system and this transitway mall was designed for pedestrians. Thus, this study concentrates on the walkability and accessibility of the transitway mall by analyzing its design elements.

1.4 Design Elements

Design elements include all forms of planting and vegetation, all adjustments, refinements, or developments in the ground form, rock groupings, water features, walks, terraces, patios, steps, walls, screens, arbors, shelters, and so on (Eckbo 1964). These are the elements used to develop and refine spaces between, around, or within buildings.

In 1959, Lynch asked participants to do an experimental walk of about five blocks along four streets of Boston while describing what they noticed (Lynch et al., 1959). The participants noted how features such as sidewalks, street furniture, retail windows, and landscaping affected their walking experience. Many designers have specified the importance of design elements in urban spaces (Unterman, 1984; White, 1990; Rubenstein, 1992; Bookout et al., 1994; Marcus et al., 1998; Burden, 2009). A comprehensive literature review was conducted to determine the design elements that impact the walkability and accessibility of urban spaces.

Proper design of these elements can create lively streets. Lively streets are an important element in successful place-making. Place-making occurs when multiple layers of design and integrity are integrated into and create an attractive, functional environment for the people it serves. From a design perspective, successful place-making requires elements that define and identify a particular location (Scully and Schmitz, 2005).

1.5 Purpose of the Study

Pedestrians have much better awareness of places and clearer ideas of their meaning and activities than drivers do. Because of the lower speed of movement,

pedestrians perceive many more differences in form and activity of urban spaces (Rapoport, 1987). Transit malls have the potential to form a new image for the city along with an opportunity to create walkable environments. Transit malls have been the most successful of the mall categories as pedestrian and transit uses complement each other (Rubenstein, 1992). The purpose of the study is to evaluate the walkability and accessibility of the downtown transitway mall by documenting and analyzing its design elements and then identifying which key design elements impact the walking experience and accessibility of similar urban spaces.

1.6 Research Questions

The primary research questions for this study are as mentioned below:

- Which design elements are most critical to the walkability of the transitway mall, from a designers' perspective?
- Which design elements are most critical to the accessibility of the transitway mall, from a designers' perspective?
- How do these design elements impact the walking experience of pedestrians, from a designers' perspective?

Based on the findings of the above questions, this study elaborates on the improvements needed to enhance the walkability and accessibility of the transitway mall in order to inform future pedestrian districts with rail based transportation in high density areas.

1.7 Methodology

This study embarks on three research methods to find solutions to the research questions: (1) a walkthrough survey with design professionals, (2) passive observation

by the researcher, and (3) a study of the Regional Mobility Initiatives data (NCTCOG, 2003). These methods will evaluate the walkability and accessibility of the transitway mall. Data triangulation method is used to analyze the findings from these three research methods. Triangulation helps obtain an in-depth evaluation of the walkability and accessibility of the transitway mall.

For the purpose of this study, the 1.2-mile stretch of the transitway mall was divided into four segments, each including one light rail station in the center. The survey method adopted for this research involves design professionals walking along these segments of the mall to answer the survey questions. The participants answered questions based on their observations of the transitway mall and on their design knowledge.

Passive observation of the transitway mall by the researcher provided insights on design elements that promote an ideal walking experience. The accessibility of the mall was also studied during passive observation. Photographs were taken to highlight the positive and negative impacts of the design elements on the walkability and accessibility.

According to NCTCOG's Regional Mobility Initiatives study (2003), rail station access is the key to increasing rail ridership. The Regional Mobility Initiatives report addresses the access—walking, bicycling, bus, and private vehicle—to rail in different sections. The findings suggest the need for efficient design elements such as sidewalks to provide a pedestrian-friendly rail-station access. The Geographical Information System (GIS) maps show the analysis and detailed findings of this research. The

findings from the three research methods are then analyzed using data triangulation techniques.

1.8 Definitions

The following definitions are based on the literature reviewed and adjusted as necessary due to the scope and limitations of this research. Definitions also depend on the purpose for which they are used.

Accessibility: A site, building, facility, or portion thereof that complies with the guidelines set by United States Access Board (United States Access Board, 2004). Accessibility refers to the ability to reach the desired goods, services and activities (Litman, 2003). Walking is an important form of access, both by itself and in conjunction with other modes.

Art: is a public display of sculptures, memorial, wall reliefs (Rubenstein, 1992) or other objects with a primarily aesthetic function (Gage, 1975). These elements enhance the sensory quality of a place, and help create an atmosphere where people wish to be (Rubenstein, 1992). The inclusion of public art and historical and other landmarks helps give an area a distinct identity. Public art and landmark features also provide points of interest and opportunities for social interaction (Scully and Schmitz, 2005).

Building facades: Buildings that enclose or frame streets are more attractive to pedestrians. It is more stimulating to walk along a street with storefronts, than to walk along the blank walls of an office complex or through the open, undefined space of a

parking lot. It is important that stores do not turn their backs to the street but have front doors that open onto the sidewalks (Scully and Schmitz, 2005).

Central Business District: The term Central Business District (CBD) is interchangeable with the term downtown. Commercially, it is the heart of the city where high levels of commercial, retail, and governmental offices reside within an identified boundary (U.S. Census Bureau, 2006). Dallas's CBD historically refers to the area bounded by Woodall Rodgers Freeway to the North, Central Expressway to the East, R. L. Thornton Freeway to the South, and Stemmons Freeway to the west (See figure 1.2 below).

Downtown Dallas: is the central portion of urban Dallas, Texas. Traditionally, the term downtown was applied to the areas considered within the CBD. However, in recent years, the definition of downtown has evolved to include many neighborhoods once considered adjacent to the downtown. DOWNTOWN DALLAS Incorporated, a non-profit organization, created to promote development and investment in downtown Dallas, describes downtown as the arts district, Cedars, Deep Ellum, Farmers Market, Government Convention Center district, Main Street district, the Trinity/Design district, West End historic district, Victory park and portions of uptown Dallas. Figure 1-2 shows all the districts in downtown Dallas.

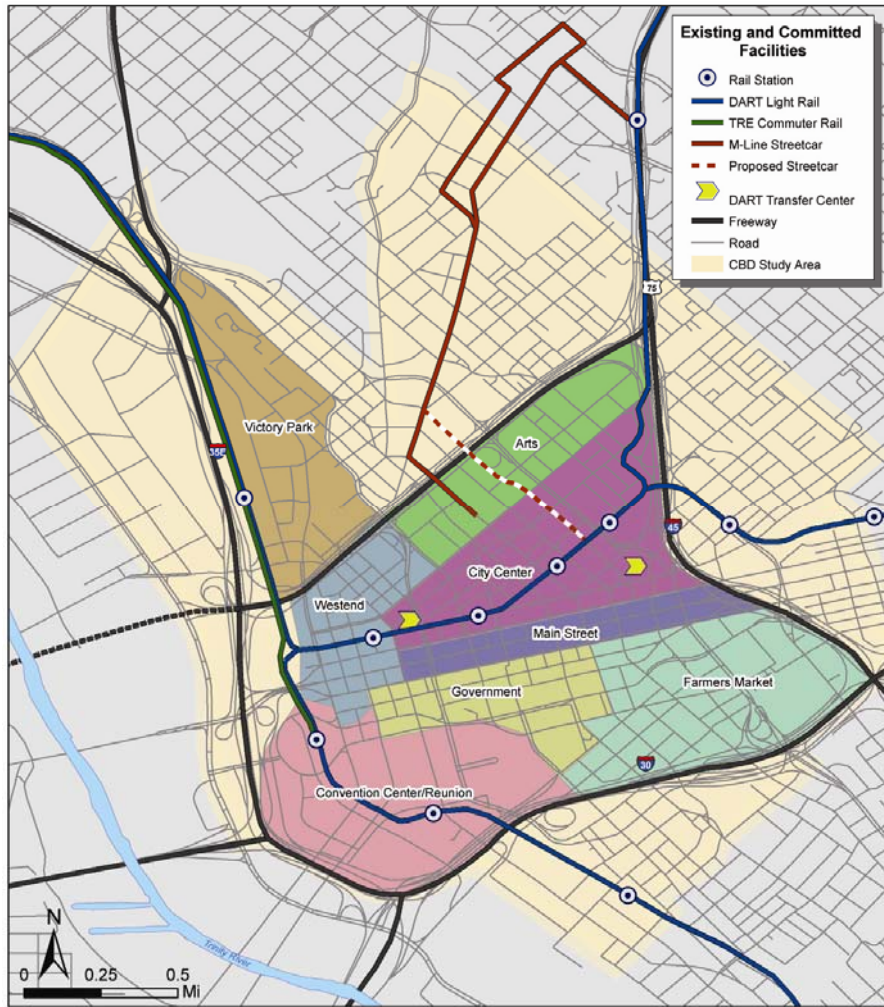


Figure 1.3 Dallas Downtown District Map (DART, 2007)

Experience: occurs in the present as a “combination of continuous, concurrent, interrelated, and parallel sequences of actions, feelings, and thoughts whose key aspect is the individual’s sense of participation in an immediate and present ongoing dynamic process” (Thiel, 1997).

Fenestration: is the design and placement of windows and other openings in a building.

Food sources: Sidewalk cafes should be allowed and encouraged so that shoppers can rest and enjoy themselves. Ideally, the outdoor seating should be adjacent to the building where the pedestrians pass on the street side (Unterman, 1984).

Legibility: is the characteristic of an environment that looks as if one could explore it without getting lost (Kaplan and Kaplan, 1982). Legibility refers to the clarity of the spatial organization and the ease with which people can read its structure (Kaiser et. al, 1995). Legibility is an aspect of the visual quality (Lynch, 1960).

Lighting: Typical lighting directs all the light to the ground. This does nothing to light interesting buildings and such other spaces (Unterman, 1984). Hence, globe lights and other light fixtures should be used, to enhance and focus on design details on the ground as well as the buildings. Smaller light fixtures mounted ten to twenty feet above ground look proportionate to the pedestrian design scale.

Light Rail Transit (LRT): is an urban railway system characterized by its ability to operate single cars or short trains in streets or exclusive right-of-ways and capable of discharging passengers at track or car floor level (NCTCOG, 2002). Electrically propelled rail vehicles operate singly or in trains. LRT provides a wide range of passenger capabilities and performance characteristics at moderate costs. The light rail in the Dallas-Fort-Worth metropolitan area is operated by DART (DART, 2005).

Mall: Traditionally, malls meant areas usually lined with shade trees and used as a public walk or promenade (Rubenstein, 1992). As used today, mall denotes a new kind of street or plaza in central city business areas oriented towards pedestrians and

served by public transit. The four major types of malls are full malls, transit malls, combined malls, and semi-malls (Rubenstein, 1992 and Ozdil, 1996).

Pedestrian mall: A full pedestrian mall is obtained by closing a street that was formerly used for vehicular traffic and then improving the pedestrian street or linear plaza with new paving, street trees, street furnishings, and other amenities such as sculptures and fountains. The full pedestrian mall should provide visual continuity, spatial character, and help create an image and sense of place for the downtown (Rubenstein, 1992).

People and Activities: should be designed to enhance the pedestrian experience and to foster lingering, gathering, and purchasing. The best pedestrian districts are those that do not look programmed but give the sense that they have evolved over time, with various designers, retailers and others making separate design decisions (Scully and Schmitz, 2005).

Perception: is of probable and definite things (James, 1918). By “probable” he meant that we tend to perceive what is likely, what is familiar, even when the stimulus is in fact not familiar. By “definite” he meant that we tend to perceive clearly, even when the stimulus is vague or blurred (Kaplan, 1978).

Seating: in the urban environments consists of a collection of chairs, benches and or built in seating (Gage, 1975). The type and placement of seating areas are important to how a space functions (Rubenstein, 1992).

Sidewalks: In retail districts, the side-walks are generators of commerce. The NCTCOG (2003) report stresses on sidewalks as a crucial element to promote

walkability. Places must be designed to be experienced on foot. Pedestrians feel most comfortable in places with well defined edges, and sidewalks are an essential means of achieving that definition. Street trees, grass strips, bollards, and specialty curbing can further reinforce the street edge (Scully and Schmitz, 2005).

Signage: When people feel oriented and confident that they can find their way around, their eagerness to explore an area is increased, and their general anxieties are lessened. Making it easier for visitors to acquire that knowledge will contribute significantly to the quality of their experiences in an urban setting (Kaplan and Kaplan, 1998). Users of a space need an understanding of the spatial organization of that setting. This can be provided with efficient signage. A distinctive and legible environment not only offers security but also heightens the potential depth and intensity of human experience (Lynch, 1960). Signs convey messages that are essential to the function, safety, and security of a mall. The sign boards should be simple and legible (Rubenstein, 1992).

Store Windows: Street oriented storefronts enhance walkability. First floor retail gives an edge to the street and helps provide definition to an area. Well merchandised and well designed public spaces are an important part of the design. Streets and squares are the urban hubs that integrate the mix of uses. The entrance to the stores should be easily visible and approachable from the sidewalk (Scully and Schmitz, 2005).

Street Furniture: In the context of this study, street furniture includes lighting fixtures, bollards, kiosks, and trash receptacles. Bollards are barriers used to define, protect, and accent areas without impeding pedestrian traffic (Gage, 1975). Kiosks are

used to display bulletin boards, street directories, display cases, and information booths (Rubenstein, 1992). Trash receptacles are containers intended for the collection of litter and waste (Gage, 1975).

Transit Mall: is developed by removing automobile traffic on an existing principal retail street and allowing only public transit such as buses, or light rail in the area. The transitway acts as a retail spine or corridor through the downtown. On-site parking is prohibited, walks are widened and specially designed streetscape treatment is provided to create a unique image for the central city area. The transit mall usually links activities along its route including retail, office, hotel, entertainment, and housing (Rubenstein, 1992).

Transitway Mall: DART's downtown mall is called the downtown transitway mall. The mall is 1.2 mile long and consists of four light rail stations which are common to all three DART routes (red, blue and the green line). The transitway mall was designed by Sasaki Associates and was opened in June 1996 (DART, 2009).

Trees: are important elements in any pedestrian oriented environment. Their quality of ever changing light, sound, movement, and pattern can serve as attractions to pedestrians while their structures can be used to define spaces (Unterman, 1984).

Urban Environment: A construction of space or spaces, including the physical and contextual elements, found within a city (Alexander 1964).

Walkability: is quality of a neighborhood or town that provides safe, convenient, and usable walkable facilities for pedestrians. In the ideal walkable neighborhood, most daily needs can be satisfied within a 5- to 10-minute walk of home and work (MPO, 2009).

1.9 Significance and Limitations

Dallas is one of the most populous cities in the country (Census, 2000), consisting of significant elements of urban environment. Dallas's DART light rail along with the Trinity Rail Express (TRE) forms the largest rail operators in the state of Texas with forty-eight miles of track. In addition, the downtown transitway mall is the only example of a transit mall in Texas. The transitway mall acts as a retail spine or corridor through the central business district. This prominence led the transitway mall to be selected as a case to study for walkability and accessibility. The transitway mall also has a wide array of design elements. In addition to common urban design elements such as vegetation, signage, seating, street furniture, and so on, the mall has significant artwork contributed by local Dallas artists.

The presence of the transitway mall in the dense business core of downtown Dallas has increased DART light rail ridership to and from these stations. Such an urban area is targeted by a considerable number of visitors daily; therefore, it is essential that the transitway mall incorporate walkability and accessibility to all pedestrians. Studying this experience provides a useful resource for future urban designs.

Pedestrians are generally attracted to mixed-use urban spaces that have activities involving people (Unterman 1984). Even from a design standpoint, the most elaborate

pedestrian spaces are the ones that are the product of a right location, a suitable mix of land use and amenities, and design elements that enhance the walking experience (Scully and Schmitz, 2005). Various mixed land uses surround the Dallas transitway mall. The mall passes through different districts of the CBD. For these reasons, this study concentrates only on the impact of the design elements on the walkability and accessibility of the transitway mall.

An observer plays an active role in perceiving the world and has a creative part in developing its image (Lynch, 1960). Design professionals observe and perceive urban spaces from the viewpoint of their professional experience and knowledge (Nasar, 1984; Kaplan, 1973). Their preference of the spaces is unique compared to that of laypersons (Huang, 1998). Further, being the designers of urban spaces, they need to understand the functioning of a space after a project is completed. Hence, design professionals' perspectives were considered valuable for this research.

In the light of the above needs and concerns, several significant issues will be addressed in the following chapters:

1. This research will provide information for a better understanding of the impact of design elements on the walking experience of pedestrians.
2. Knowledge gathered from this study can be used as a resource for future urban design projects similar to the transitway mall.
3. This study will elaborate the significance of design elements in landscape architecture and urban design.

The following are the limitations of this research:

1. The primary scope of this research is limited to the walkability and accessibility experience along the transitway mall.
2. The walkthrough survey method required the participants to be physically present at the transitway mall to complete the survey. Hence, only design professionals from the Dallas-Fort Worth metropolitan area participated in the research.
3. Due to the limited survey population considered for this research, a number of responses to the questionnaire may be inadequate for a satisfactory overall statistical analysis.
4. Although the results of this research may have implications on other such transit mall districts, they cannot be generalized for all transit malls.
5. Due to limitations of this research, such as users perceptions of walkability and accessibility of the transitway mall are not considered for this study.

1.10 Chapter Summary

Walking is a fundamental activity for physical and mental health, providing physical exercise and relaxation. It is a social and recreational activity. Environments that are conducive to walking are conducive to people. Walking is also a critical component of the transportation system, providing connections between homes and transit, parking lots and destinations, and within airports. Often, the best way to improve another form of transportation is to improve walkability (Litman, 2009).

Sasaki Associates designed the 1.2-mile transitway mall where the two DART light rail lines converge in downtown Dallas. City officials were hopeful that the new train line, signage, plantings, and stations could revitalize street-level retail shops and spur new development along Pacific Avenue and Bryan Street. An evaluation of the mall's walkability and accessibility, to determine if the mall functions the way it was conceived by the designers. Further, this would provide an insight for future designs. Such a study, coupled with the design professionals' input, provides crucial information for forthcoming district level urban design projects that promotes walkability and accessibility.

Urban environments with good quality walkable and accessible spaces can increase pedestrian usage of the mall plus an increase in public transit ridership (Rubenstein, 1992). This research aims to determine which design elements of the transitway mall that impact its walkability and accessibility. Professionals with design and planning knowledge were surveyed for the purpose of this research and their comments noted. Data triangulation was used to analyze the data obtained from the research methods. The results of the transitway mall study identify significant architectural and landscape elements and demonstrate their ability to enhance the pedestrians' overall walking experience. In addition, more people would get exercise as part of their daily lives if the built environment supports pedestrians and bikers.

Following the introduction, this research elaborates on the literature reviewed for this research (Chapter 2). The literature review is followed by chapter three on research methods. Surveys, passive observation, and analysis of the Regional Mobility

Initiatives data are the three methods used for this research. Chapter four presents the analysis and findings of this research. Conclusions are demonstrated in Chapter 5.

CHAPTER 2

LITERATURE REVIEW

A review of the existing literature on relevant subjects was conducted during the course of this research. Continued reference to existing literature also provided explanations and context in which to view research findings. Literature review concentrated primarily on walkability, accessibility, pedestrian malls, and transit malls. Literature regarding research and evaluation techniques was examined. The growth and development of downtown Dallas and DART was also studied through the literature. The chapter concludes with a summary of the reviewed literature.

2.1 Walkability and Accessibility in Design Literature

Pedestrians are attracted to mixed-use urban districts where there is activity involving people watching, socializing, being seen, and just being around other people (Unterman, 1984). Such urban spaces must be made handicapped accessible with the presence of ramps, elevators, and similar features. The walkability experience of an urban space helps attract pedestrians. Separation from cars, improved transit, weather protection, shortcuts, attractive shop windows, plantings and street furniture extend the distance that people are willing to walk (Unterman, 1984).

2.1.1 Walkability

Walking down the street promotes casual socializing. Walking allows a person to visit different types of shops, thereby promoting locally owned businesses; this, in turn, promotes manifold civic benefits including support of local institutions to the physical caretaking of the streets (Kunstler, 1996). Walking is also spiritually elevating. Pedestrians use neighborhoods, and a much finer scale of detailing inevitably occurs. Building facades become more interesting. Little gardens and window boxes appear. Shop windows create a continuity of visual spectacle, as do outdoor cafes. Pedestrians make streets safer by their very presence. Kunstler further adds, “In such a setting, we feel more completely human”.

Walking not only provides transportation but also a transportation experience that supports the local economy, increases safety, and improves the human condition by creating friendships, beauty and interest in ones surroundings (Kunstler, 1996). The most recent comprehensive plan for the City of Dallas, entitled ‘Forward Dallas’, described the ideal pedestrian way as street sidewalks that:

“...pulsate with activity and encourage rich, exciting urban interrelations. Street cafes, vendors, musicians and tourists enliven these streets while coordinated signage address the needs of pedestrians and travelers, whether they are residents, local office workers or visitors to downtown. Street furniture, light standards, bicycle racks and information kiosks should be strategically located while awnings, arcades and trees will provide shade from the hot Texas sun. Wide sidewalks allow people to comfortably walk abreast or sit outside to enjoy a leisurely meal” (Forward Dallas, 2006).

To achieve such an environment, “Forward Dallas” suggests, “Parking lots lining the streets, buildings with large setbacks, or buildings with blank street facing facades alienate pedestrians rather than invite them to enjoy the space” Much emphasis is given

to creating the character of the streetscape and design elements when building sidewalks. The Downtown Parks Master Plan, completed in June 2004 by the City of Dallas Park and Recreation Department (PARD), recognizes that downtown currently is not a pedestrian-friendly place due to building heights, amount of paving, lack of open space, and “people spaces that don’t make sense for a pedestrian-oriented downtown” (City of Dallas PARD 2004).

Although walking is a critical component of the transport system, walking is undervalued for a variety of reasons. Walking is more difficult to quantify than vehicle travel, and walkability tends to be more difficult to evaluate than motor vehicle traffic. Most travel surveys have undercounted non-motorized travel because they ignore short trips, non-work travel, travel by children, recreational travel, and non-motorized links. Walking links are often ignored even if they take place on public rights-of-way and utilize as much time as motorized links (Litman, 2009). As mentioned earlier, travel surveys often collect little information on total walking activity, while it is relatively easy to count vehicles, measure traffic speeds, and incorporate vehicle travel into travel models. As a result, most walking is invisible to transportation planners. However, travel surveys can collect more detailed information on non-motorized travel—for example, asking respondents to identify any walking trips on public rights-of-way—and, in recent years, new techniques have been developed to better evaluate walkability.

Walking is generally considered a lower-status activity than motorized travel. Civic leaders and transportation professionals generally prefer to be associated with improvements to air travel, driving conditions, and major transit service, since they are

perceived as more important (Litman, 2009). Because walking is the mode used by lower-income people, it tends to be stigmatized; however, motorized transport tends to be associated with success and progress. One reason walking tends to be overlooked is that it is so inexpensive. As a result, there is not an organized “walking industry” as there is with automobile, transit and air transport. Further, there is little funding dedicated to walking (Litman, 2009). Improved walkability can provide consumer cost savings, but such costs are difficult to predict and often given little consideration. Decision-makers take walking for granted and assume that walking takes care of itself (Goodman and Tolley 2003). For example, it is possible to walk along roads that lack sidewalks, either in the roadway or on dirt paths along road shoulders. As a result, walk and cycling facilities are given low priority. Such insensitivity to walking conditions is misplaced: areas with poor walkability tend to have significantly less walking and more driving than more walkable areas (Litman, 2009).

Conventional planning ignores or undervalues benefits such as the fitness and public health benefits of active walking, enjoyment of walking and cycling, and improved mobility options for non-drivers. Many transportation economic evaluation models even ignore benefits such as reduced congestion, parking cost savings, and consumer cost savings that result when travel shifts to non-motorized modes (Litman, 2009). Greater appreciation of the full benefits of walking could change planning priorities. Table 2.1 describes the economic, social, and environmental benefits of walking.

Table 2.1 Land Use Benefits of Improved Walkability (Litman, 2009).

Economic	Social	Environmental
Improved accessibility, particularly for non-drivers.	Improved accessibility for people who are transport disadvantaged.	Reduced land needed for roads and parking facilities.
Reduced transportation costs.	Reduced external transportation costs (crash risk, pollution, etc.).	Open space preservation.
Increased parking efficiency (parking facilities can serve more destinations).	Increased neighborhood interaction and community cohesion.	Reduced energy consumption and pollution emissions.
Can increase local business activity and employment.	Improved opportunities to preserve cultural resources (e.g. historic buildings).	Improved aesthetics.
Support for transit and other alternative modes.	Increased exercise.	Reduced water pollution.
Special support for some businesses, such as walking tourism.		Reduced “heat island” effects.
Health cost savings		

Dan Burden, founder of Walkable Communities, Inc., focuses on the need for “walking audits” for the redesign and visioning of sprawling urban spaces. Burden’s Walkable Communities, Inc. has developed a twelve step checklist for defining, achieving, or strengthening a walkable community (Burden, 2009). The checklist specifies the need for a universal design. A healthy community has a healthy respect for people of all abilities, with appropriate ramps, medians, refuges, crossings of driveways, sidewalks on all streets where needed, benches, shade, and other basic amenities to

make walking feasible and walkable for everyone. The entire checklist is provided in Table 2.2.

2.1.2 Accessibility

Accessible is a term first introduced in the 1950s to describe elements of the physical environment used by people with disabilities (Hopper, 2007). Originally, the term described facilities that could be used by wheelchair users, but it has evolved to include designs for wider groups of people, such as the visually impaired, which require more functionality. The need for accessible design has increased as a result of continuing medical advances. Concurrent with the medical advances has been the development of new building technologies—including residential elevators, wheelchair lifts, and power door operators—that have made accessibility more practical and less expensive. Accessible design will continue to change as medical advances and building technologies continue to evolve (Hopper, 2007).

In 1961, the American National Standards Institute (ANSI) published the first national standards for accessible design. After its publication, many state and local jurisdictions began to adopt the ANSI standards as their accessibility code, although selected standards were often modified to fit their communities. In 1980, ANSI expanded to include housing standards focused primarily on the need of wheelchair users, specifically paraplegics. To encourage states to adopt the standards and promote uniformity, the 1986 revision eliminated all scoping requirements. The Architectural Barriers Act of 1968 was the first federal regulation that required accessible design in public facilities. The Fair Housing Amendment Act (FHAA) of 1988 was

unprecedented as the first federal law to regulate private residential construction. The American with Disabilities Act (ADA) of 1990 provided new civil right protection for people with disabilities, and its guidelines include new federal accessibility standards. ADA addresses the design and operation of privately owned public accommodations as well as state and local government facilities and programs. ADA design standards are similar to the 1986 ANSI standards, although ADA does not include housing design requirements because they are addressed in the earlier FHAA (Hopper, 2007).

The Access Board's Checklist is designed to be a convenient source for identifying architectural and communication barriers encountered by people with disabilities in private and public facilities. The checklist may assist in planning for removal of barriers. It may be used to survey an entire facility or specific areas and components. On July 23, 2004, the U.S. Access Board published new design guidelines that address people with disabilities under the Americans with Disabilities Act (ADA). These guidelines update access requirements for a wide range of facilities in any public and private sectors covered by the law (United States Access Board, 2004).

Removal of barriers that limit movement is now a widely accepted practice in street design. Urban space design must be universal (Unterman, 1984). This can be achieved by providing adequate accessible parking, ramps, handrails, curb ramps, and elevators as per the ADA requirements. This research studies the accessibility of urban spaces in Dallas' downtown transitway mall.

2.2 Design Elements of Urban Spaces

Major American cities such as Chicago, New York, San Francisco, and Washington, D.C. have been defined by their pedestrian focus and have remained viable and strongly competitive centers of business and culture. Smaller towns like Asheville, North Carolina and Boulder, Colorado, have remained desirable places to live and work largely because of their pedestrian focus (Scully and Schmitz, 2005).

Pedestrians are attracted to mixed-use urban spaces that have activities involving people (Unterman, 1984). From a design standpoint, the most successful pedestrian places are those with right location, a suitable mix of land uses and amenities, and design elements that enhance the walking experience (Scully and Schmitz, 2005). Designing pedestrian-oriented places means embracing the human scale over vehicular convenience, while still accommodating vehicular traffic and parking. According to Walkable Communities, Inc.'s Burden, a number of elements must be included to encourage and facilitate pedestrian activity (Burden, 2009). There must be destinations that draw people. The community must be built on a pedestrian scale, meaning that distances are short enough to walk and that buildings are close to the sidewalk. Scully and Schmitz state that destinations must be reachable and interconnected by means of a continuous network of safe, convenient, comfortable, and interesting sidewalks and paths (Scully and Schmitz, 2005).

Environments conducive to walking are conducive to people (Scully and Schmitz, 2005). Understanding the needs of pedestrians and factors that affect

pedestrian travel is important when designing pedestrian facilities and predicting travel mode choices. Pedestrian needs and the opportunities for walking are diverse. The main issue is not the sidewalk facility alone but the total pedestrian experience. The design elements of an urban space play a crucial role in creating the walking experience. This research identifies the design elements that affect the pedestrian walking experience within Dallas' downtown transitway mall.

2.2.1 Matrix of the Design Elements

The design literature review matrix was created after extensive research on landscape architecture and urban design literature. This design matrix was used to derive the most common design elements in pedestrian oriented urban spaces. Table 2.2 shows the design elements matrix before the year 2000 (Ozdil, 2008). Literature from the years 2000 to 2009 generated a new design elements matrix (see Table 2.3). The elements were scored on the basis of their number of appearances in the matrix. Ten elements were chosen from the spreadsheet to be studied in detail for this research.

Table 2.2 Design Literature Review Matrix (Ozdil, 2008).

Unterman, 1984	White, 1990	Rubenstein, 1992	Marcus et al. 1998	Oppewal and Timmermans, 1999
What factors enhance walking?	Seven factors to increase the use of central plazas;	Design Elements;	Design Review Checklist for Urban spaces;	Perception Response Categories for Public Space;
Mixed uses	Sittable space	Scale & proportion	Visual Complexity	Appearance
Restaurants	Street	Connection Signs	Uses, Activities and Programs	Location
Compact land uses	Sun, specifically existence of light	Hard Surface	Microclimate	Selection of Food Stores
Sidewalks	Food source	Tree Planters, pots	Subspaces	Selection of clothing and shoe stores
Activity/people	Water, for attraction and relaxation.	Fountains, sculptures, landmarks	Circulation	Pattern
Unfolding views/diversity	Trees , for shade, security or protection	Lighting	Seating	Indoors
Public transportation	Triangulation; major attraction, such as musician, sculpture, or architectural future	Seating	Food	Pedestrians
Window shopping		Shelters, Canopies	Paving	Crowdedness
Nearby destinations		Facilities	Planting	Greenery
Short cuts		Traffic Parking , transportation	Public Art/ Fountains/ Sculpture	Decorations/ Maintenance
			Vendors	Coffee Shops
			Information & Signs	Window Displays
			Maintenance & Amenities	Activities

Table 2.3 Design Literature Review Matrix (2000-2009)

Scully and Schmitz, 2006	Hopper, 2007	Burden, 2009	Burden, 2009
Factors for creating successful walkable places	Crucial accessibility criteria	Checklist for walkable communities	Areas analyzed in a walking audit
Mixed land-use	No protruding objects in circulation paths	Intact town centers	Sidewalk width and condition
Restaurants with outdoor seating	Street furniture within reach range	Mixed use	Street crossings
Coffee shops	Curb ramps	Public space	Connectivity to parking
Abundant parking but not in front of buildings	Walking surfaces with a slope of 1:20	Accessible design	On-street and off-street parking
Public art/Landmark features	Hard surface material	Speed controlled streets	Tree canopy
Fountain/Sculpture	Elevators	Linkage between streets and trails	Building placement
Signage	Platform (wheelchair lifts)	Pedestrian scale	Restorations
Streetscape	Ramps with railing	People and activities	Mixed land use
Corner stores	Accessible seating areas		
Public transportation			
Avoid blank facades			
Scale and proportion			
Amenities and attractions			
Street oriented storefronts			
Well merchandised stores			
Activity/people			
Canopies, awnings			
Unified landscaping			

2.3 Concept of Malls in Design Literature

There are three types of malls: the full pedestrian mall, the transit mall (see Figure 2.5), semi-mall and the combined mall (Rubenstein, 1992 and Ozdil, 1996). A full pedestrian mall is obtained by closing a street that was formerly used for vehicular access and then improving the pedestrian street or linear plaza with new paving, street trees, street furnishings, and other amenities such as sculptures and fountains. This type of mall should provide visual continuity, spatial character, and help create an image and sense of place for the downtown. A pedestrian mall can also create a new image for the central business district and new opportunities for mixed land uses. Pedestrian malls emerged in the United States beginning with the Kalamazoo, MI, mall in 1959.

“The primary reason for building a full pedestrian mall is to revitalize an area of the central business district in order to increase retail sales, to strengthen property values, to compete with suburban shopping centers, and to encourage private investment by creating stable environment for retail business” (Rubenstein, 1992, p.65).

A transit mall usually is developed by removing automobile and truck traffic on an existing principal retail street and allowing only public transit such as buses or light rail in the area. The transit acts as a retail spine or corridor through the central business district. Rubenstein further explains that on-site parking is prohibited in transit malls, walks are widened, and a specially designed streetscape treatment is provided to create a unique image for the central city area. Semi-malls are located on primary streets going through major retail areas in center city locations. The amount of traffic and parking is reduced. Combined malls occur by combining different mall types. The condition and

the importance of street layouts in the CBD leads to the creation of combined malls (Ozdil, 1996).

The Nicollet mall in Minneapolis, Chestnut Street transitway in Philadelphia, Portland's Transit Mall, and Vancouver's Granville mall are a few of the successful transit malls (Rubenstein, 1992). According to the survey on the nationwide transit malls to determine success rate conducted by Rubenstein, pedestrian uses and transit uses complement each other. In some cases, such as in Portland, transitways were designed primarily as transportation facilities that bring people into the city from residential or suburban areas. Rubenstein further suggests that transit malls are a good solution for larger cities. They are better than completely closing a block to traffic and can help improve transit while providing an identifiable image for the city.



Figure 2.1 16th Street Transit Mall in Denver, Colorado (Denver city data, 2007).

2.4 The Downtown Transitway Mall

During the early 1990s, downtown Dallas was troubled by ten million square feet of vacant space and only a handful of residents. Millions were spent on new downtown streets and parks, but none of them linked to the new light rail line (Martin, 1999). The 1993 Strategic Plan of Dallas highlighted the construction of DART's light rail through the central business district as a unique opportunity to create an urban environment in downtown Dallas (Central Dallas Association, 1993). The transitway mall was planned using a pedestrian-friendly design with this intention.

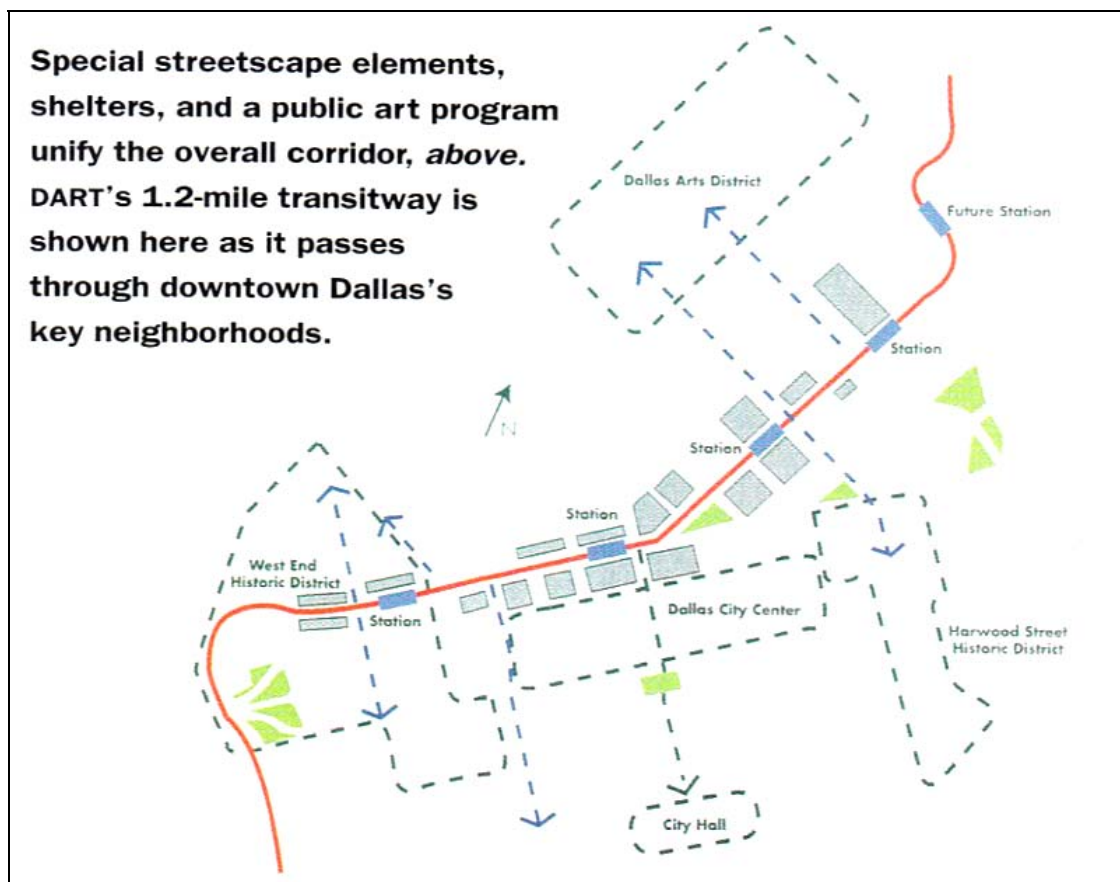


Figure 2.2 Concept plan for the Transitway Mall (Martin, 1999).

DART officials took the unusual step of having an urban design and landscape architecture firm, rather than an engineer, lead the design process for the downtown transitway mall. Working with the client and many user groups, Sasaki conceived the mall as a “Ramblas of the Southwest,” referring to Barcelona’s famous linear park (see Figure 2.2 for the concept plan). The 1.2-mile transit corridor includes four light rail stations. The role of Sasaki Associates in the development of the mall is elaborated as follows:

“Sasaki came to the project to help DART understand the design potential for the projected transitway mall and related development opportunities. From the start, the city knew that the transitway had to be more than just a corridor for light rail. Sasaki played the role of facilitator to balance the varying expectations of the city, the transit agency, and the public. The city was concerned about traffic; DART worried about cost and efficiency; and the downtown community sought a public amenity that would improve retail business” (Martin, 1999, p.34).



Figure 2.3 Downtown Transitway Mall-West End Station

The entire length of the mall was planned to be unified with street trees, special streetscape treatments, and a dynamic public arts program. Public squares were planned to mark the location of each transit station, while blocks between stations were designed to distinguish the transitway, local access, and pedestrian zones. These improvements were designed to support the development of ground-level retail uses, to animate the street, and to provide a safe environment during off-peak hours.

The 11.2-mile starter section of DART opened in June 1996 and includes the downtown transitway mall (see Figure 2.3). It is paved with bricks, and there are two lines of light rail branching into downtown south (Myerson, 1996). Its landscape accoutrements are now firmly part of the city's character, and it is providing a real transportation alternative to those in the Dallas region looking for a more sustainable way of living (Sasaki associates, 1996). The contextual timeline, below, explains the history of DART in relation to downtown Dallas.

2.4.1 Contextual Timeline

A contextual timeline was prepared to explore the activities that influenced the DART transitway mall.

1871 - Dallas acquired its first mule-drawn streetcars.

1890 - Electrification of streetcar lines in Texas began.

1900 - The first electric interurban line was built between Sherman and Denison.

1924 - The railway served 33 cities on lines running from Denison to Waco and reached Dallas, Fort Worth, Denton, Cleburne, Terrell, and Corsicana.

1925-1935 - Many of the local streetcar lines were in decline because of financial difficulties and were shut down or substituted with bus service by the early 1930s.

1939 – The Dallas-Fort Worth route of the interurban railway was terminated.

1948 - The last interurban ran on December 31, 1948, from McKinney to Dallas.

Late 1950's - Suburban areas were served by an additional network of city lines, run by the Dallas Railway and Terminal Company, but this declined in the late 1950s.

1956 - Introduction of the Interstate highway programme in 1956.

Mid-1970 - Attempts to improve public transport were back on the agenda.

1983 - Rail, light rail and bus operator DART was formed.

A 1% sales tax approved by residents of the 13 cities benefiting from DART services helps to fund the operation (Myerson, 1996).

1988 - Sasaki Associates was commissioned to design the transitway mall for Dallas's central business district, a 1.2-mile path that would accommodate a light rail system for DART.

1990 - DART light rail was instigated in the mid-1990s, as a forward-thinking project associated with a major redevelopment of Dallas.

1996 - The first phase of DART line opened in June with 16 miles of track and twenty-one stations. Trains started operating on the red and blue lines. The first segment of the Trinity Railway Express (TRE) from Dallas to Irving opens.

The 1.2 mile transitway mall (See Figure2-4) designed by Sasaki Associates was opened for business.

The first year recorded 1.4 million passengers.



Figure 2.4 DART Transitway Mall

2001 - TRE links Dallas and Fort Worth by commuter rail for first time since 1930s.

2004 – On November, 12th, a 1.25-mile spur to the Victory station at the American Airlines Center (a sports arena) was opened. This spur will eventually be part of a line to northwest Dallas and suburbs, but for now it will operate only during events at the arena.

2005 – DART reported a total of 17.5 million passengers

2008 - Station renovations in the downtown Dallas transitway mall were started and completed.

2009 – First phase of the southeast corridor of Green line opened.

Daily DART Rail service to Victory Station began on September 14th.

All trips of the Trinity Railway Express (TRE) now serve Victory Station. Victory Station is the transfer point between the Green Line and the TRE.

2010 – Second phase of the southeast corridor of the Green line to be completed by December.

2011-2018 – Fourteen miles of the northwest corridor of the orange line are slated for opening.

2018 - The extensions planned will double the network's length from 45 miles to 90 miles.

2030 - The North Texas region is on pace to double in population – to approximately 8 million by 2030.

The 2030 Plan is being built on the success of today's system and ongoing expansion. Approximately 43 miles of additional rail service will be added according to the plan.

Source: Most of data mentioned above is obtained from DART (2009).

2.5 Chapter Summary

Literature review was conducted on various topics during the course of this research. The topics primarily studied were walkability, accessibility, design elements, transit malls, and the downtown transitway mall. Literature was reviewed to study the benefits of walking for pedestrians. Health, social, and economical benefits were reviewed. The significance of accessibility of urban spaces and handicapped accessibility were analyzed for the purpose of this research. Then, the significance of design elements in urban spaces was reviewed from the literature. A matrix of these design elements was generated for the research methods. The concept of malls was studied. After the introduction of the mall concept, this chapter progressed to describe the literature on downtown transitway mall. A contextual timeline representing the history of DART and the transitway mall is also shown. This reviewed literature was used for the process of this research. The succeeding Chapter 3 will describe the research methods used. Chapter 4 will demonstrate the analysis and findings obtained from these research methods. The conclusions to this research are shown in Chapter 5.

CHAPTER 3

RESEARCH METHODS

This chapter describes the process of site selection, the three methods used in the research, and the ways to analyze this data into specific conclusions. A combination of three research methods was used for this study: walkthrough surveys, passive observation, and analysis of data from the Regional Mobility Initiatives Report. Chapter 3 describes the implementation of these research methods for evaluating the walkability and accessibility of the downtown transitway mall.

3.1 Site Selection and Application

Site selection was the first step in this scholarly investigation. The metropolitan area of Dallas is the fourth largest in the United States and the largest in Texas with a population of 1.6 million. Today, the Dallas Area Rapid Transit (DART), along with the Trinity Rail Express (TRE), forms the largest rail operator in the state of Texas with 48 miles of track. North Texas plans on expanding the rail system by adding 43 miles of tracks by 2030. Other prominent metropolitan areas such as Houston, Austin, and San Antonio are also implementing rail-based transportation for passengers. Although rail-based passenger transportation is growing exponentially, examples are still limited that support the design and accessibility of transit stops and transit districts. One of the most prominent examples of a pedestrian-oriented urban space in Texas is DART's

downtown transitway mall, which was built in the 1996 (Martin, 1999). The transitway mall is the first and the only transit mall in Texas. The mall is a diverse, dynamic part of downtown Dallas, providing evidence of the vital and vibrant CBD of which it is a part. DART's downtown transitway mall, which includes four light rail stations, was thus identified for this study (see Figure 3.1).

Transitway malls act as a retail spine or corridor through the CBD (Rubenstein 1992). The downtown transitway mall's location in the dense business core of downtown Dallas has increased the DART ridership to and from the mall stations. Considering the number of people using this mall, it is essential to study the mall's walkability and accessibility for pedestrians. Such a study will provide a useful resource to be used for future urban designs.

From a design standpoint, the most elaborate pedestrian spaces are those that are the product of a right location, a suitable mix of land uses and amenities, and design elements that enhance the walking experience (Scully and Schmitz, 2005). The transitway mall is located amidst a mix of land uses. The mall passes through different districts of the CBD, giving each station a different character. The mall encompasses a wide array of design elements such as vegetation, signage, seating, street furniture, and more (Martin, 1999). Further, since the mall was conceived as a pedestrian-friendly space 13 years ago, a study to understand if the designer's concept was achieved will serve as a guide for future projects. All these reasons make the transitway mall a suitable case for evaluating the walkability and accessibility of urban spaces.



Figure 3.1 Light Rail Route in Downtown Dallas (DART, 2009)

3.2 Data Collection

Data collection for this research included three methods: walkthrough surveys, passive observation, and utilization of data from the Regional Mobility Initiatives report and maps. The data obtained from these three sources were triangulated using the data triangulation technique to provide an in-depth evaluation of the walkability and accessibility of the transitway mall. Two steps were taken prior to the data collection process:

List of significant design elements: The first step for this study was to derive a list of significant design elements. The design literature review matrices (see Tables 2.2 and 2.3) were further analyzed according to the number of their appearances in the

matrix. Table 3.1 shows the results of this analysis. This newly generated design elements matrix was used for passive observation. The design elements from the matrix were also used to prepare the survey questionnaire.

Table 3.1 Design Elements Matrix

No.	Physical design Elements
1.	Trees, planters, pots
2.	Activity/people
3.	Restaurants with outdoor seating, coffee shops, food vendors
4.	Public art/water feature
5.	Hard Surface
6.	Information & Signs
7.	Scale and proportion of openings/fenestration
8.	Seating space
9.	Avoid blank facades
10.	Curb ramps
11.	Maintenance & Amenities
12.	Ramps with railing
13.	Shelters, Canopies
14.	Sidewalks
15.	Street furniture
16.	Lighting
17.	Well merchandised stores with street oriented storefronts
18.	Mixed land uses
19.	Public Transportation

Dividing the transitway mall into segments: The second step involved the simplification of the transitway mall's 1.2-mile stretch by dividing it into four segments, each segment comprising a light rail station (see Figure 3.2). The division of the mall into four segments helps better evaluate the walkability and accessibility.

The transitway mall stretches linearly along Pacific Avenue and Bryan Street. The mall begins at the intersection of Pacific Avenue and Houston Street and continues

to the intersection of Bryan and N. Hawkins Streets. The first segment (West End) of the mall stretches from Houston Street to N. Griffin Street and includes West End Station. The West End segment is followed by the Akard segment, which starts at N. Griffin Street and continues to N. Ervay Street. This segment includes Akard Station. The next segment is St. Paul, which spans from N. Ervay Street to Olive Street and includes St. Paul Station. Last is the Pearl segment, which starts at Olive Street and continues to N. Hawkins Street. This segment includes Pearl Station.

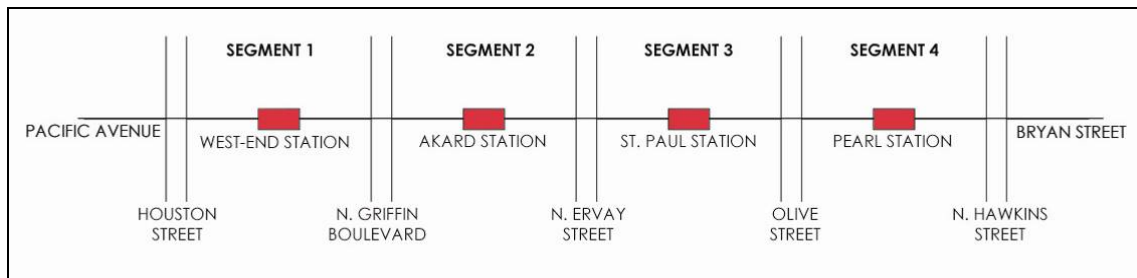


Figure 3.2 Graphic Representation of Transitway Mall Segments

3.2.1 Regional Mobility Initiatives Data

The Regional Mobility Initiatives is a series of reports on the transportation planning activities and air quality programs of the North Central Texas Council of Governments (NCTCOG) and the Regional Transportation Council, together serving as the Metropolitan Planning Organization for the Dallas-Fort Worth Area since 1974 (NCTCOG, 2009). As a part of the Regional Mobility Initiatives reports, a study on the rail station access was conducted by NCTCOG in February 2003. The report was prepared as part of the Regional Mobility Initiatives series and called “Rail Station Access.” According to the report,

“Rail station access is the key to increasing rail ridership, yet many barriers prevent access to the region’s rail system. Local improvements such as sidewalk repair or new developments at stations can help solve regional mobility constraints by providing more transportation alternatives” (NCTCOG, 2003).

The Regional Mobility Initiatives report on rail station access studied sixty stations, including both light rail and commuter rail stations. Roughly one-half mile of each station was studied and the presence or absence of sidewalks was noted. The study also catalogued Americans with Disabilities Act standard curb cuts and pedestrian traffic signals. Various forms of access that were analyzed for this study were walking, bicycling, bus, and private vehicle access. The findings of this study are represented as Geographic Information Systems (GIS) maps. The maps show existing as well as needed curb cuts and sidewalks. Fieldwork for this study was conducted by NCTCOG staff in coordination with DART, local governments, and the public. The study concludes with implementation strategies to increase bicycle and pedestrian access to rail. The study also suggests adding or making small-scale improvements to sidewalks, trails, and bicycle routes together with land use changes to encourage such development. The data from this study is described in detail during the findings analysis in Chapter 4.

The Regional Mobility Initiatives data addressed only the sidewalk- and curb cut-related issues at the transitway mall and suggests improvements to the sidewalks and curb cuts to enhance pedestrian and bicycle access. Due to the limitations of this data, two other research methods—surveys and passive observations—were used for this research.

3.2.2 Walkthrough Survey

Lynch and Rivkin (1959) conducted an experiment on the streets of Boston to learn what an ordinary individual perceives in the landscape. For the purpose of the experiment, a group of random citizens was chosen. An interviewer took a short walk with an interviewee along a selected block in Boston. The survey method used for this research incorporated the idea of walking with the interviewee along the transitway mall to note their observations and comments. This research used similar survey techniques with a group of design professionals, which included architects, landscape architects, and urban designers. Students of either bachelor's or master's programs in architecture, landscape architecture, or urban design were included in the group of design professionals for this research.

The subjects for the current study's survey were recruited through personal contacts. The contact details were obtained from company websites or from the American Society of Landscape Architects (ASLA) website. These subjects were either e-mailed the subject recruitment letter or contacted by telephone (see Appendix B). Students pursuing either a bachelor's or master's degree in architecture, landscape architecture, or urban design at the University of Texas at Arlington were also e-mailed a subject recruitment letter that requested their participation in the survey. Every participant had to be eighteen years or older to be in compliance with the Internal Review Board (IRB) at the University of Texas at Arlington. The student group was recruited using personal contacts. No course credits or incentives were given for participation in the survey.

Appointments were set with the students and professionals at their convenience. Each participant was asked to arrive at West End Station at the scheduled time. Each received a five-page survey and oral instructions. All participants were asked to walk the four segments of the transitway mall and provide answers on the survey questionnaire (see Appendix B for sample survey pages and cover letter). The data obtained from these surveys is charted in Chapter 4.

The survey is a combination of open-ended and close-ended questions. Close-ended questions allow for comparisons of specific answers by giving only certain choices from which to pick (Peterson, 2000). The survey questionnaire consists of two sections: Section A asks demographic and basic design questions. Section B questions are rated using a modified Likert scale, a widely used rating scale, named after developer Rensis Likert (Peterson, 2000). The original Likert scale has five categories consisting of two parts: a declarative statement and a list of response categories. The response categories used for this survey are: strongly disagree, disagree, neutral, agree, and strongly agree. The survey was designed to determine the designers' perspectives of individual design elements in creating a successful walking experience for pedestrians.

3.2.3 Passive observation

When you observe a space, you learn how it is used rather than how you think it is used. Observation enables you to quantify what would otherwise be regarded as intuition or opinion (Madden, 2000). One of the primary methods to evaluate walkability is to study the quality of the path. With that aim, passive observation was used to

identify and document design elements of the transitway mall and determine their functionality in context of the mall.

Passive observation of each segment began by walking the linear distance of the transitway mall and documenting its design elements (see Figure 3.3). The transitway mall was recorded photographically to highlight the positive and negative issues contributing to the experience of walkability and accessibility. Four spots were chosen in each segment for observing these elements and their usage. As the design elements and their characteristics were identified, their functional descriptions were documented in the matrix (see Appendix A). These elements were recorded for their quantities. A detailed description of the elements was noted with systematic site visits. The data collected from passive observation was charted using spreadsheets (see Appendix A). The results of the observations are detailed in Chapter 4.



Figure 3.3 Design Elements at the Transitway Mall

Data collection took place on weekdays as well as on weekends. Observations were recorded mostly during the mornings, afternoons, and early evenings in the month of October. The main tools used in the research process were detailed design element matrices and a digital camera. Field notes that were made while observing transitway mall, and its users were charted (see Appendix A).

3.2.4 Data triangulation

The data findings from the three research methods were analyzed using data triangulation. Triangulation is defined as an “attempt to map out, or explain more fully, the richness and complexity of human behavior by studying it from more than one standpoint” (Cohen and Manion, 1986). Triangulation is used to indicate that more than two methods are used in a study with a view to double- or triple-check results. This also is called “cross examination.” Researchers can be more confident with a result if different methods lead to the same result. By using three methods to get the answer to one question, the hope is that two of the three methods will produce similar answers; if three clashing answers are produced, the investigator knows that the question needs to be reframed, methods reconsidered, or both. Triangulation is a powerful technique that facilitates the researcher in validating data through cross-verification from more than two sources (Cohen and Manion, 1986).

The four basic types of triangulation are data triangulation, investigator triangulation, theory triangulation, and methodological triangulation (Denzin, 1978). Data triangulation is commonly used and involves time, space, and persons. The data

collected from the three research methods is triangulated using data triangulation. The conclusions of this research are based on the results of the three methods.

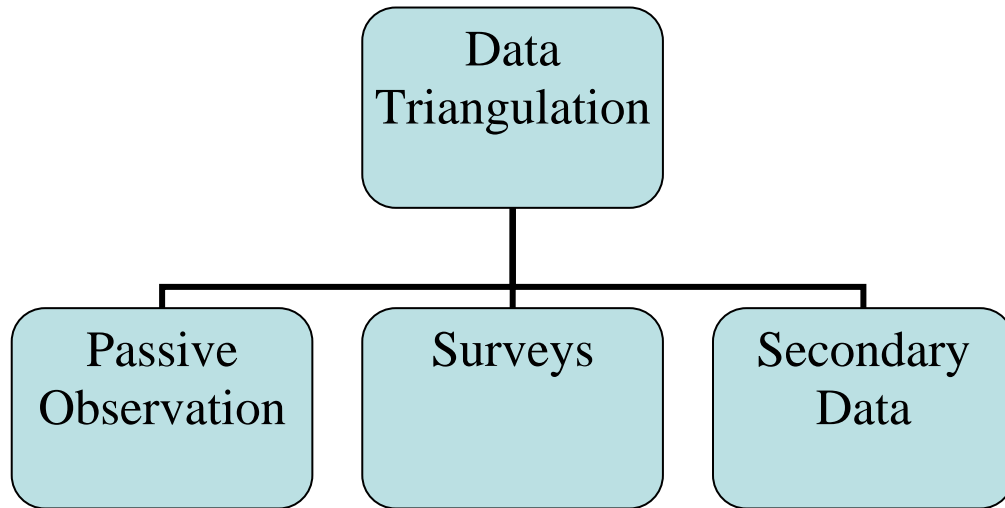


Figure 3.4 Relationships between Data Triangulation and the Research Methods

3.3 Summary of Research Methods

Permission to do research on DART’s downtown transitway mall was obtained from DART Director Morgan Lyons in April 2009. Three research methods were used: walkthrough surveys, passive observation, and secondary data. The data obtained from these three methods are triangulated using the data triangulation method. The transitway mall was divided into four segments for data collection. A concise matrix of design elements derived from literature review was used a base for the passive observation and survey questionnaire. The design professionals surveyed for this research included architects, landscape architects, urban designers, and students from these three disciplines. Passive observation was conducted at the transitway mall on weekdays

during daylight hours. The transitway mall was recorded photographically during passive observation. Data collected on the design elements was charted using spreadsheets (see Appendix A). The data and GIS maps obtained from Regional Mobility Initiatives study were used for this research. The findings and analysis of the research is explained in Chapter 4 with the conclusions in Chapter 5.

CHAPTER 4

RESEARCH ANALYSIS AND FINDINGS

This chapter begins with an overview of the research methods, and then findings from the first section of the survey are demonstrated. The analysis of the walkability and accessibility data is described with respect to the individual design elements. An overview of the findings is given, and the chapter ends with a summary.

4.1 Overview of Research Methods

An overview of the three research methods used for this research: walkthrough surveys, passive observation, and analysis of Regional Mobility Initiatives data, are elaborated here. Walkthrough surveys were conducted using a five-page survey questionnaire and an introductory cover sheet describing the research (see Appendix B). Pretesting was done with a group of individuals—friends having a background in architecture, landscape architecture, and urban design—who are similar to the targeted study participants. The pretest group said the survey questions were easy to answer, relevant to the topic, and took less than forty-five minutes to complete along with the 1.2-mile walk. Therefore, the pretest indicated that the survey questions were relevant to walkability and accessibility of urban spaces (Peterson, 2000).

Analysis from the surveys yields specific results that can be charted, so the data collected was compiled into spreadsheets (see Appendix C). Passive observations were made during daylight hours on weekdays and weekends. Systematic data collected

during these observations was charted (see Appendix A). Data from the Regional Mobility Initiatives study were also analyzed to generate findings.

Finally, data triangulation method was used to analyze the findings from these three research methods. Design elements and the respective findings from the three methods are described in the Walkability and Accessibility Data Analysis section of this chapter.

4.2 Survey Findings

The first section of the questionnaire includes eight questions. Out of these eight questions, six are based on the profile of the survey participant. The remaining two questions are based on the survey participant's perceptions of urban spaces. In addition, out of the eight questions, six are close-ended questions while the other two are open-ended questions. The six close-ended questions and their findings are described in the next section.

4.2.1 Profile Information

The six profile-based questions from Section A of the questionnaire and their findings are elaborated here. Out of the total survey invitations sent to design professionals, a positive response rate of 43% was obtained. Sixty-five percent of the survey participants were males and 35% were females. The survey participants were architects, landscape architects, urban planners, or students of any of the three disciplines. The findings regarding the occupation of the participants are shown in Figure 4.1, below.

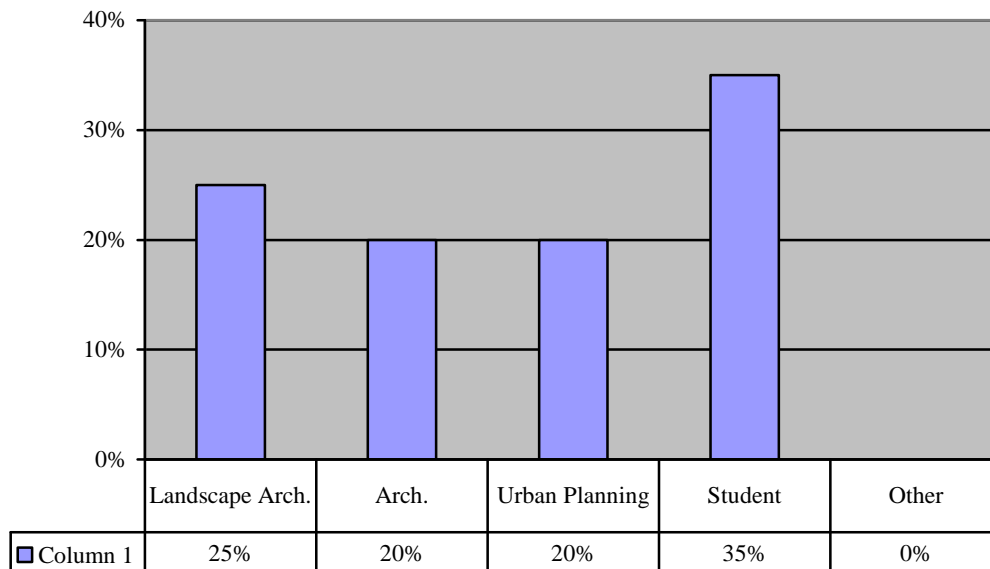


Figure 4.1 Occupations of the Survey Participants

Out of the total participants, the largest percentage (35%) was students. The percentage of design professionals from each of the three disciplines was more or less similar ranging from 20% to 25%. Further, the students were asked about the number of design courses they had taken to understand their level of experience. The statistics reveal that 86% of the students had taken 5 or more courses, while 14% had taken one-two courses.

The survey participants were asked about the downtown transitway mall. The findings show that 35% of the participants visit the mall for activities other than riding the DART light rail, while 65% did not visit the mall for other activities. The results also show that 35% of the participants had visited the mall one-two times, while 10% visited the mall three-five times. Only 10% had visited the mall more than twenty times per month, and 45% of the participants had not visited the mall at all before the survey.

The next question related to the significance of the design features. To determine these features of urban transit malls, the survey participants were asked to rate any five of the ten design elements according to their significance. The findings are demonstrated in Figure 4.2, below.

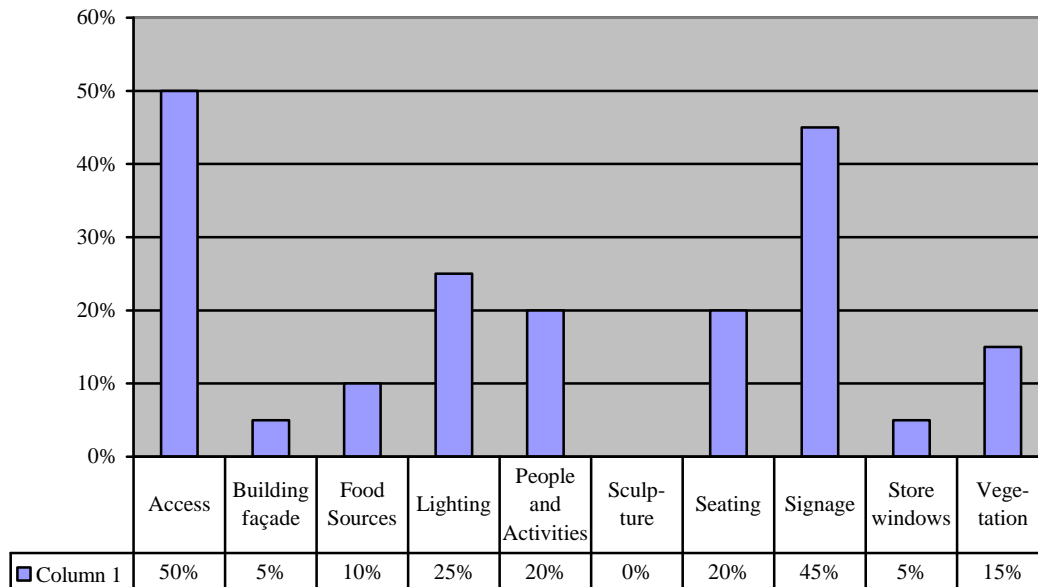


Figure 4.2 Importance of the Design Features of Transit Malls

The top six elements as derived from the above bar chart are: accessibility, building façade, food sources, seating, signage and vegetation.

4.2.2 Open-ended questions

Section A of the survey questionnaire contains two open-ended questions. One of the two questions asked survey participants about activities in which they have been involved at the transitway mall. Data collected from the answers to this question are demonstrated in Figure 4.3, below.

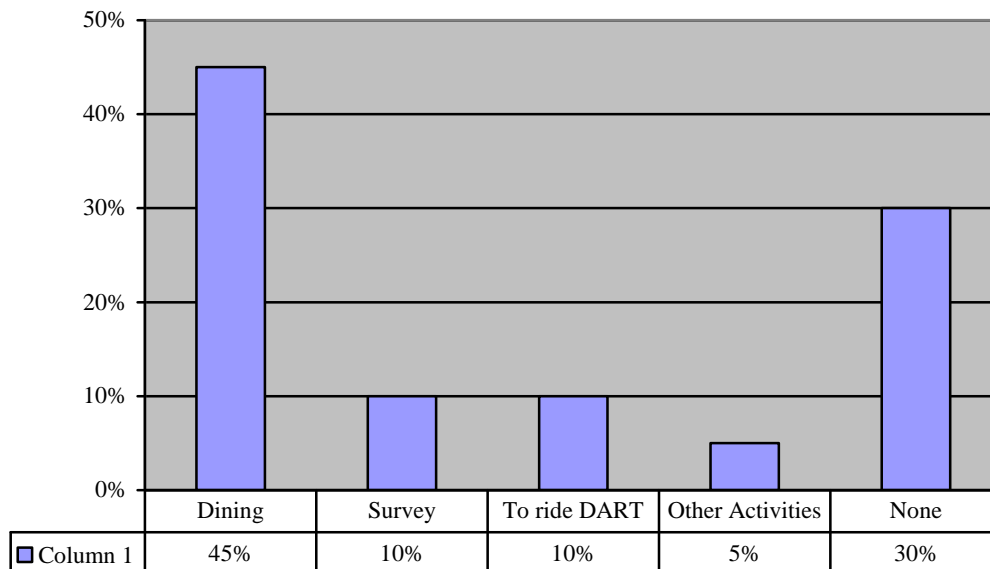


Figure 4.3 Survey Participant's Activities at the Transitway Mall

From the chart, we can infer that a maximum percentage (45%) of the participants dine at restaurants along the transitway mall, while 10% use the mall to ride the DART light rail and buses. Ten percent had visited the mall for taking surveys, and the remaining 5% were involved in other activities.

The second open ended question is listed below:

Please list one pedestrian oriented urban space that you like the most. Then please list the most recognizable feature or quality that you remember about this place from a walkability and accessibility standpoint.

There was a wide range of answers to this question. No two participants named a similar place with the exception of West End Station, with two of the twenty participants naming this as the most liked pedestrian space. Hence, a list of nineteen pedestrian-oriented urban spaces from around the world was obtained. The entire list is

displayed in Appendix C. Out of the twenty survey responses, other pedestrian-oriented urban spaces in Texas mentioned by the design professionals were:

West End station, Dallas TX: for its close proximity to nice restaurants like the Sonny Bryan Steakhouse, Corner Bakery and Chipotle.

River-walk, San Antonio, TX: for its well designed landscapes, water features and art-work. The presence of restaurants and the mall at a close proximity create pedestrian friendly atmosphere. Also, the presence of people and activities creates a wonderful atmosphere.

Thanksgiving Square, Dallas, TX: no specific reasons were provided by the participant.

6th Street, Austin, TX: its proximity to many restaurants.

Some other pedestrian oriented urban spaces outside of Texas are mention below with the participant's comments on the most recognizable features.

Powell street, San Francisco, CA: Nice façade of buildings, various activities along the street, 100% walkable, but too crowded and 50% accessible.

3rd street promenade, Santa Monica, CA: Water features, accessibility, lighting, people and the presence of various musicians and other performers, restaurants.

Shinjuku, Kamakura, Tokyo, Japan: Paving was well designated, canopy tress for shade.

Millennium Park, Chicago, IL: Park is located in high traffic area; numerous nice pathways allow easy pedestrian traffic flow even in crowded situations. There is also a trolley system that frequents the park regularly for added ease of getting around.

Linking Road, Mumbai, India: Public transportation, vendors on the footpath and shopping create a walkable atmosphere.

Hyde Park, London (and all the other royal parks): Acts as a pedestrian only direct route from one neighborhood to another.

Berlin main station: Huge yet easy to find your destination even if you don't speak German, many eateries/shops. It is essentially a huge mall.

Indian Habitat Center, Delhi, India: The scale of the building and the landscape areas compliments each other. The vegetation and the art work make the environment very lively and a good experience for the pedestrian.

Link between Tate Modern on the south bank of Thames and St. Paul's in London, UK: Great pedestrian path with Foster Bridge. Great link from modern to old.

4.3 Analysis of the Walkability and Accessibility Data

Findings from the walkthrough survey, passive observation, and the Regional Mobility Initiatives data are combined and presented here for each design element. However, the Regional Mobility Initiatives data were limited and addressed only the sidewalk and curb cut issues at the transitway mall.

The walkthrough survey asked participant responses to rate statements on design elements (Section B) based on a modified Likert scale. A Likert scale normally has five categories; for the purpose of data analysis, these 5 were reduced to 3: disagree, neutral, and agree.

4.3.1 Vegetation

Survey findings show that 80% of the participants agree that the vegetation in the St. Paul segment provides a good walking experience for pedestrians (see Figure 4.4). For the Akard segment, 40% of the people agree that the vegetation here provided a good walking experience; the 30% who disagree blames the choice of vegetation for not providing balanced vegetation. Participants also suggest that canopy trees would improve the vegetation in this segment.

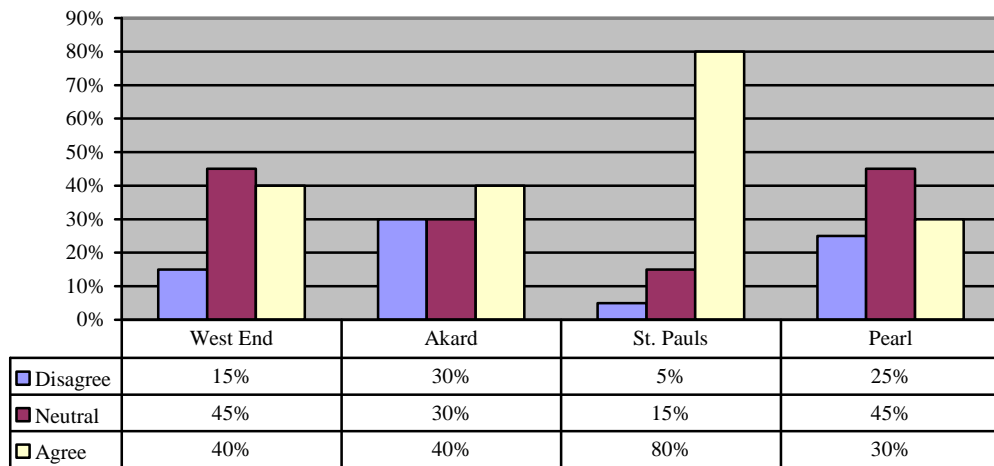


Figure 4.4 Vegetation in this Segment Provides a Good Walking Experience.

Passive observation findings support the survey findings. It was observed that the station areas have good vegetation compared to the rest of the segment. Passive observation also shows that the vegetation around the West End (see Figure 4.5) and St. Paul Station is pleasant and well maintained. However, the Pearl and Akard Station areas are an exception: Overall, the Pearl segment has meager or no vegetation in some parts. One of the participants commented that the station looks very open without the

presence of trees. The Akard segment lacks canopy trees and is not properly maintained.



Figure 4.5 Canopy Trees at West End Station

As stated earlier, the vegetation between two stations is bare and not maintained. This was observed between West End and Akard Stations and between Akard and St. Paul Stations. Some of the survey participants felt that the stretch between West End and Akard is the worst and they did not enjoy walking there. However, the stretch between St. Paul and Pearl is an exception to this with the presence of good vegetation. The Cancer Survivors plaza between the two stations creates a good atmosphere for pedestrians. In addition, part of the transitway mall outside Bryan Tower between St. Paul and Pearl Stations is well landscaped and seems an ideal place for people. People seem to enjoy the space for having lunch or conversations.



Figure 4.6 Vegetation along the St. Paul Segment

Overall, the vegetation in the St. Paul segment (see Figure 4.6) was observed to be functional with the presence of canopy trees for shade. The presence of well-landscaped areas such as the Plaza of the Americas, Cancer Survivors Plaza, and Bryan Tower makes the vegetation purposeful to enhance the pedestrian walking experience. The survey results also reinforce the passive observation finding. Regional Mobility Initiatives data were studied. However, no data were found for the transitway mall vegetation.

4.3.2 Food Sources (Vendors, Coffee Shops, and Restaurants)

The West End segment has three restaurants with outdoor seating that faces the train tracks. Most of the survey participants like the outdoor seating at these restaurants. A few participants who work around the CBD area state that they frequent these restaurants. About 70% of the participants felt that the presence of West End restaurants

with outdoor seating creates a lively atmosphere for pedestrians to walk (see Figure 4.7). Eighty-five percent of participants disagree regarding food sources in the Pearl segment, with the presence of just one restaurant.

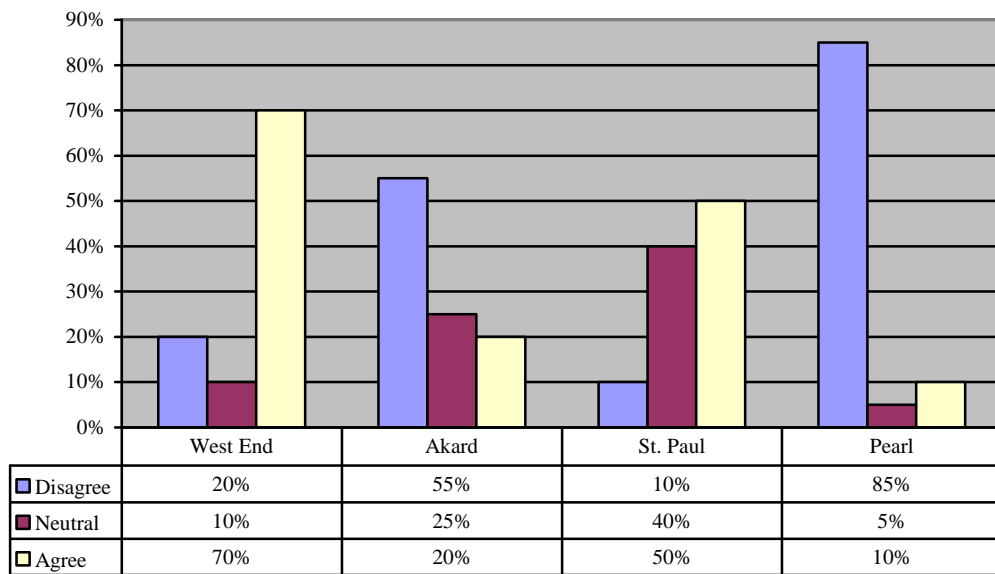


Figure 4.7 Presence of Food Sources creates a Lively Experience for Pedestrians in this Segment.

The passive observation findings further strengthen the survey results on the presence of food sources. The West End stretch boasts three popular restaurants: Corner Bakery, Chipotle, and Sonny Bryan Steakhouse. The St. Paul segment has three restaurants. These restaurants do not have outdoor seating, but the presence of awnings makes them inviting. Further, they seem to be scaled appropriately for the narrow pathway leading to their access (see Figure 4.8).

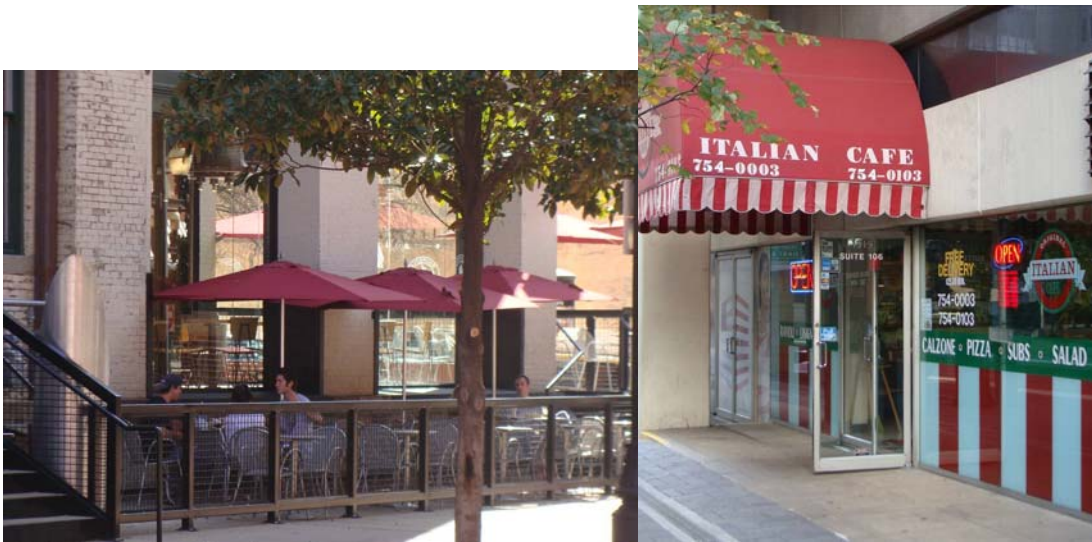


Figure 4.8 A Restaurant at the West End Segment and an Italian Café at the St.Paul Segment

The Akard segment has three restaurants, but their presence is inconspicuous. None of these three restaurants has outdoor seating. Most of the participants felt that these restaurants seem uninviting and inappropriately located. The Pearl's segment has only one restaurant, which is inconspicuous. Again, the location of the restaurant makes it uninviting and dull (see Figure 4.9).



Figure 4.9 Restaurant at the Pearl Segment

4.3.3 People

A maximum number of survey participants agreed that the presence of people in the West End, Akard, and St. Paul segments creates a lively atmosphere for other pedestrians along the transitway mall. However, the survey participants did not feel the same about Pearl Station. For various reasons, Pearl Station had few or no people at most times, which is reflected in the survey findings (see Figure 4.10).

The passive observation findings were similar to the survey results: People were seen on the West End segment, Akard segment, and St. Paul segment at all times. Out of these three segments, West End had the maximum number of people at all times during the passive observation (see Figure 4.11). The presence of El Centro College and the bus transfer center near this station have made this station the most used. Large populations congregate at this station during most times of day due to the presence of West End’s historic district, sixth-floor museum, and ample restaurants.

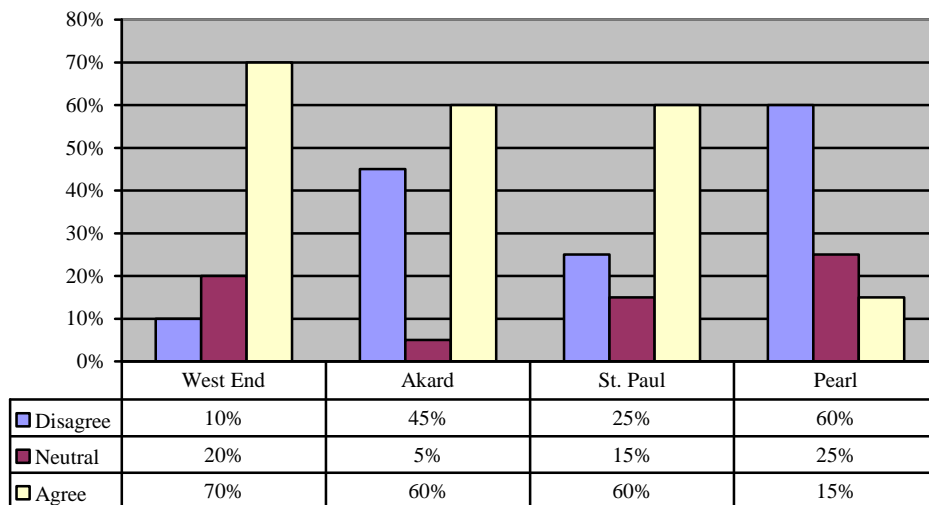


Figure 4.10 Presence of People creates a Lively Atmosphere for other Pedestrians in this Segment.



Figure 4.11 West End Station at 2 pm on a Weekday

Some of the participants who took the survey on day of the Texas vs. Oklahoma University game said that they felt uneasy due to the threatening nature of locals—mainly drunken teenagers—at West End Station. The plazas between Pearl and St. Paul Stations were observed to be busy with people and activities on weekdays (see Figure 4.12). The Pearl segment is empty during off-peak hours on most occasions.

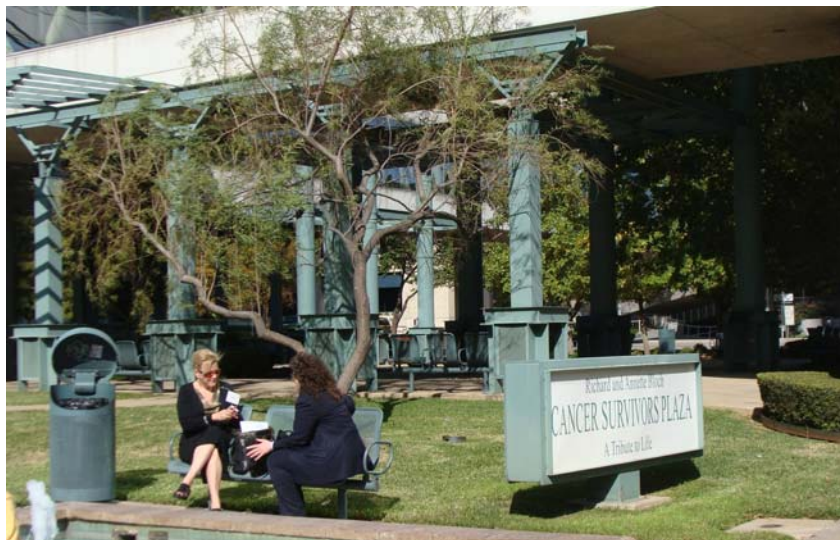


Figure 4.12 The Cancer Survivors Plaza

4.3.4 Artwork

Artwork along the West End segment is located at the two ends of the station. Thirty percent of participants noted that the inappropriate location of the artwork does no good to enhance the pedestrian walking experience along the segment.

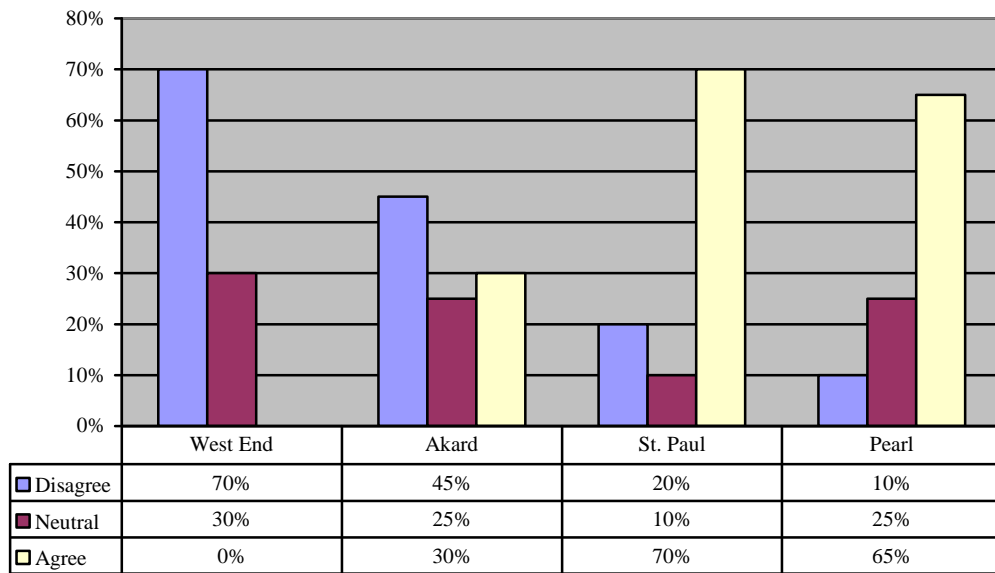


Figure 4.13 Presence of Artwork Provides a Good Walking Experience along this Segment

Seventy percent of the survey participants appreciated the artwork in the St. Paul segment. They remarked that the artwork made them linger around this segment to study the beautiful pieces. The passive observation findings echoed these survey results.



Figure 4.14 Artwork at the St. Paul Segment

Figure 4.14 shows a piece of artwork common to all four transitway mall stations. The artwork is a map of the transitway mall district, and each piece has a three-dimensional effect highlighting the particular station each piece of art is located. However, survey results show that the artwork is enjoyed only when appropriately placed in the station. Passive observation shows that people seem to relate to this kind of artwork while waiting for the trains or just walking.

The artwork along the Akard segment is inconspicuously located at the end of the station. On the other hand, the Pearl and St. Paul segments have well-placed artwork at intervals that are enjoyed by pedestrians (see Figure 4.15).



Figure 4.15 Artwork at the Cancer Survivors Plaza

4.3.5 Water features

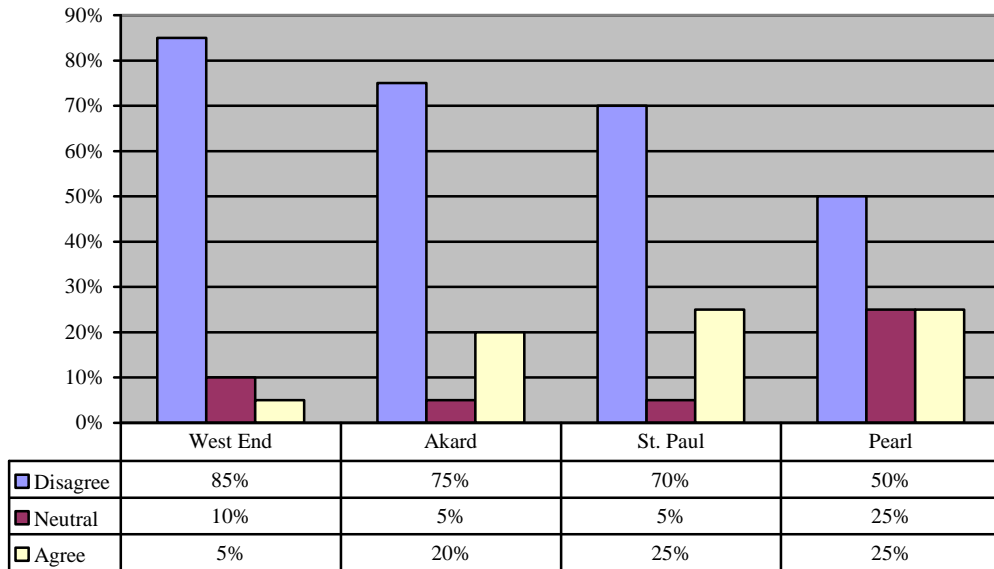


Figure 4.16 Presence of Water Features Provides a Good Walking Experience in this Segment

Figure 4.16, above, shows that the majority of the survey participants disagreed about the survey statement on water features. The participants commented that the water features in the transitway mall are scarce. Only one segment has a water feature, and it is invisible due to the presence of a huge wall.



Figure 4.17 The Wall outside Thanksgiving Square



Figure 4.18 Water Feature beyond the Wall at Thanksgiving Square

It was observed through passive observation that none of the water features along the transitway mall creates a good walking experience for pedestrians. Most of the water features along the transitway mall fail in their purpose due to lack of visibility or accessibility from the mall. The water feature in the West End segment was inconspicuous due to the overpowering trees surrounding it. The 10-foot wall outside Thanksgiving Square blocks the view of the water feature from transitway mall users. Additionally, signs prohibit walking along the wall. If the wall were absent, then pedestrians would be able to enjoy the large-scale water feature even from opposite side of the tracks.

4.3.6 Signage

The survey findings indicate that all the four segments of the transitway mall have the necessary signage.

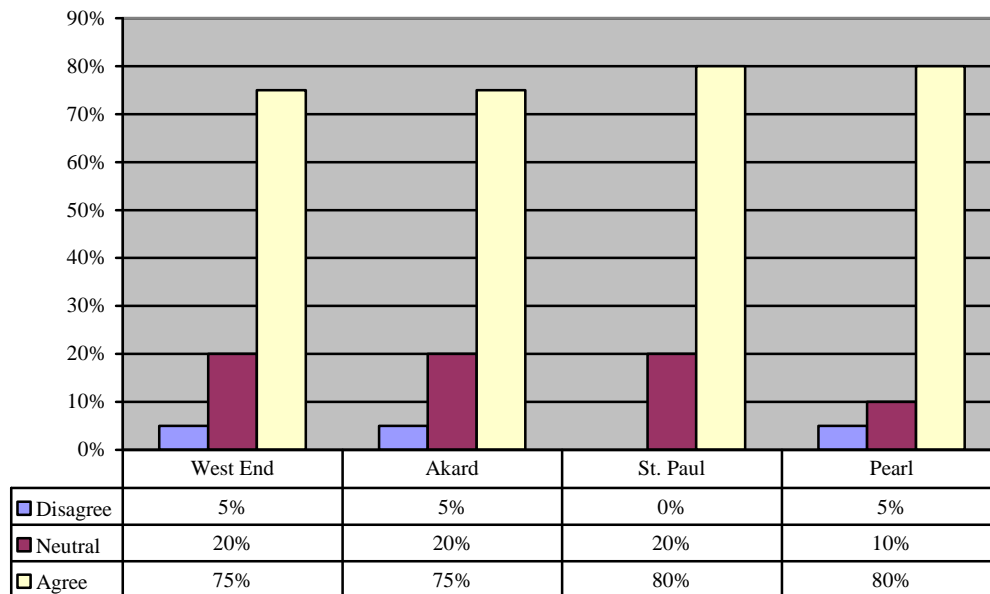


Figure 4.19 There is Enough Informational Signage along this Segment



Figure 4.20 Signage at the Transitway Mall

It was observed that there was enough signage at all segments of the transitway mall. Signage at the mall consists of caution statements such as the ones displayed in Figure 4.20. Informational signage includes the station names and train routes.



Figure 4.21 Informational Signage

4.3.7 Lighting

The survey findings, as demonstrated in Figure 4.22, below, clearly indicate that a majority of the participants agreed on the adequacy of lighting at the transitway mall. Though all the surveys were conducted in the daylight hours, the design professionals used their expertise and knowledge for this decision.

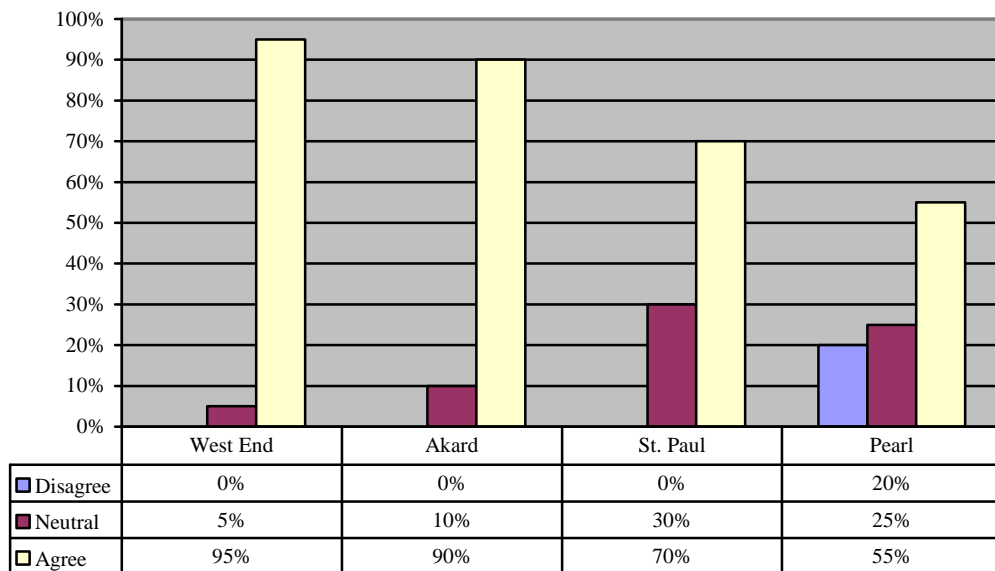


Figure 4.22 The Lighting in this Segment is Adequate for Walking after Sunset

Passive observation showed that the lighting in all the four segments of the transitway mall seems adequate for walking after sunset. Light fixtures at most segments are located at a distance of 35 feet to 40 feet from each other. Most of the survey participants who had visited the mall after daylight hours also felt that the transitway mall is adequately lit at night.



Figure 4.23 Light Fixtures at the Transitway Mall

4.3.8 Surface material

The survey findings on surface materials in the transitway mall showed a clear majority appreciate a couple of design elements mentioned above. As seen from the charts below, a majority of the survey participants agreed that the surface materials of the mall are efficient for walking. A majority of the participants at all four segments of the transitway mall agreed that the surface material is suitable for wheelchair navigation.



Figure 4.24 Surface Material along the West End Segment

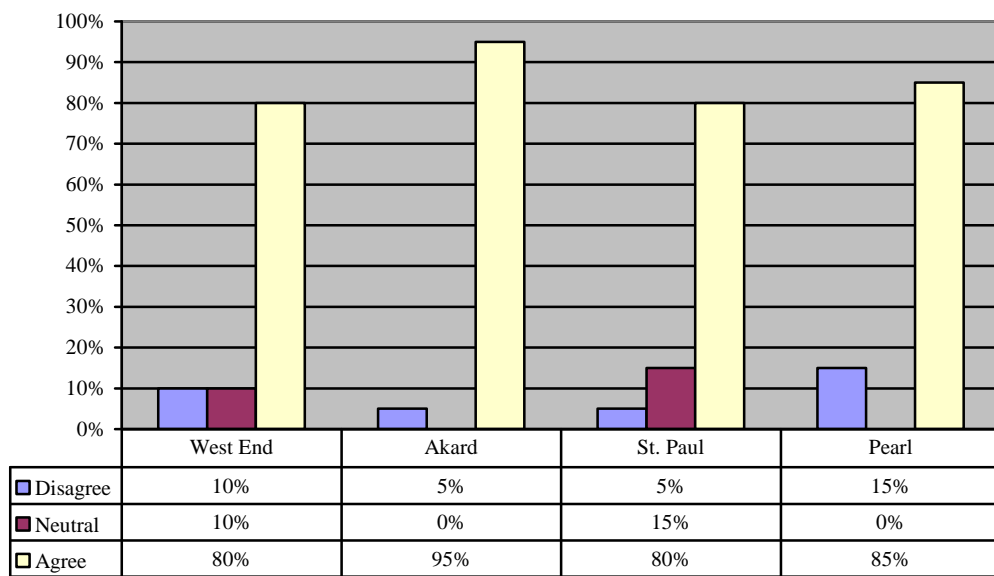


Figure 4.25 Efficiency of the Surface Material for Walking

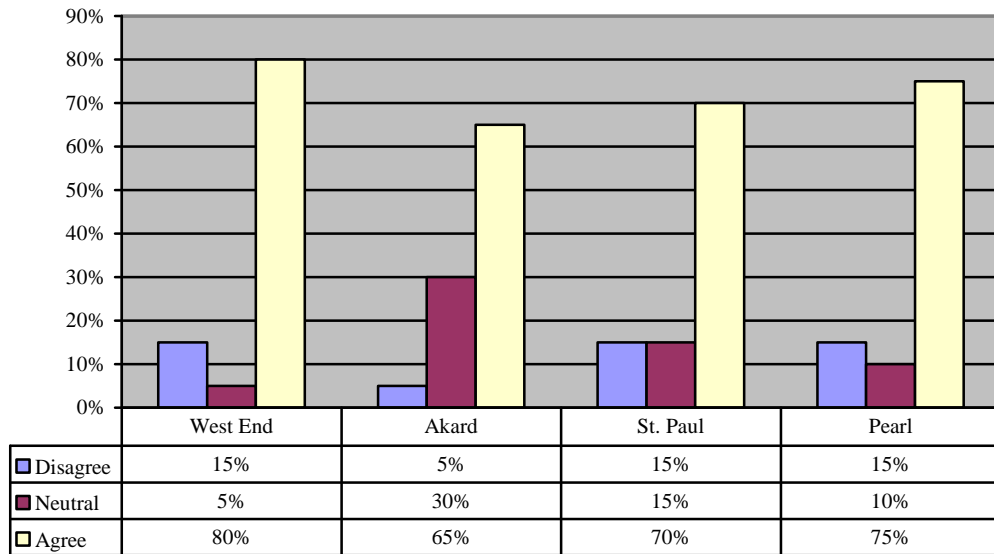


Figure 4.26 Efficiency of the Surface Material for Wheelchair Navigation

The surface material at the West End segment reflects the historic arts district. The paving used is brick or concrete pavers. All the station areas have a 1-foot-wide, non-slip pavement strip along the edge of the platform for safety of DART passengers. Figure 4.24 shows the surface material at the West End segment.



Figure 4.27 Typical Paving at Akard, St. Paul and Pearl Segments

Typically, concrete pavers are used for the other three segments with some variations at intervals (see Figure 4.27). The Akard Station has patterns created with different pieces of granite below the station area canopies (see Figure 4.28).



Figure 4.28 Granite Pavers at Akard Station

Some decorative pavers, such as the one shown in Figure 4.29, are seen around Thanksgiving Square area of the Akard segment. The surface material is well maintained throughout the mall with the exception of the Ervay Street intersection, where pavers are set too far apart, leaving dangerous gaps.



Figure 4.29 Decorative Pavers around Thanksgiving Square

4.3.9 Seating

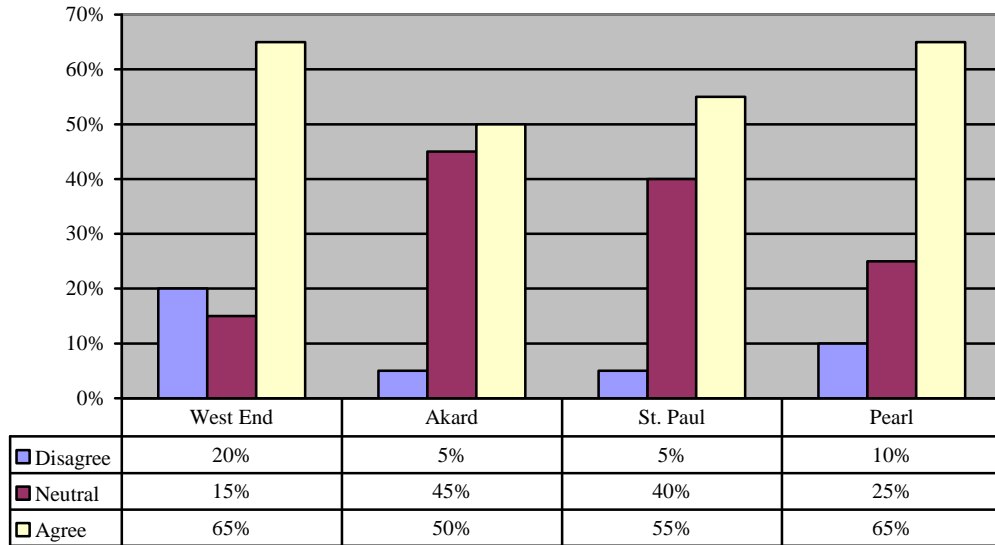


Figure 4.30 Sufficient Seating Spaces

The survey findings showed that a majority of the participants at each segment agreed on the presence of sufficient seating areas (see Figure 4.30). However, a few participants noted that the seats are concentrated only around the station areas, while the areas between stations have no resting places. The plazas in this stretch accommodate numerous pedestrians. Lack of seating deteriorates the walkability of the mall. Exceptions to this were the Pearl and St. Paul segments, where extra seating is available.



Figure 4.31 Seating at Pearl Station

It was observed that all four transitway mall stations have ample seating space to accommodate passengers (see Figure 4.31). However, it was observed that during peak hours at West End Station, people prefer standing or leaning against buildings while waiting for the trains (see Figure 4.32). West End Station use additional seating, considering the number of people using this station.



Figure 4.32 People Waiting at West End Station

One of the issues related to seating, observed at St. Paul Station, was the presence of niches above the seat. People seem to misuse these by putting trash in the niches. Figure 4.33 shows an empty bottle in the niche, and other items observed in the niches included brown bags with leftover food, cigarette butts, and so on.



Figure 4.33 Niche above Seating Areas at Pearl Station

There were two common types of seating areas at the transitway mall. One was the three seater metal seats and the other type was the one seater attached to the posts holding the station area canopy. Both seemed equally popular amongst the users.

4.3.10 Street Furniture

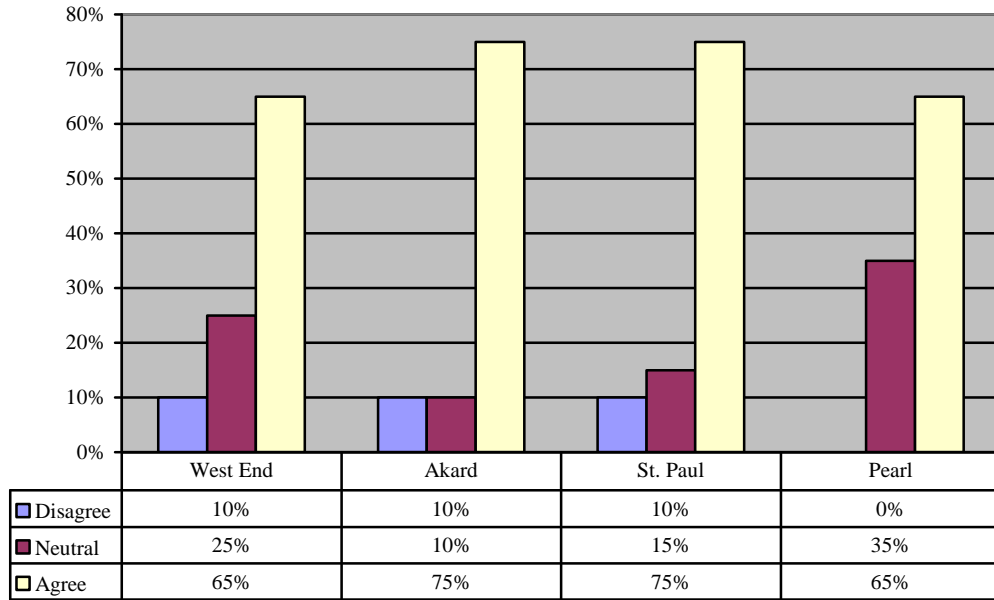


Figure 4.34 Street Furniture Fulfills the Functional Requirements of Pedestrians

A majority of the survey participants agreed to the survey statement on street furniture. Street furniture includes trashcans, information kiosks, telephones, and newspaper dispensers.



Figure 4.35 Street Furniture at Akard Station

It was observed during passive observation that all the four segments have adequate street furniture to promote a good walking experience (see Appendix A). There are four ticket machines at each station. Along with the ticket machines (see Figure 4.35) are a light fixture, a voucher-validating machine, a telephone, and an information post that displays weekday and weekend train schedules as red, blue, and green routes. As seen from observation, this group placement works ideally for passengers. Many survey participants appreciated the placement of street furniture. There are also an adequate number of trashcans along the transitway mall. A trashcan is situated next to most seating areas. One of the issues regarding trashcans was maintenance. A number of trashcans were broken and did not have covers (see Figure 4.36).



Figure 4.36 Trash Can at Akard Station



Figure 4.37 Magazine Dispensers at Akard Station

The newspaper dispensers are ideally located below the canopy toward the back as opposed to other locations in the transitway mall district where they are placed on sidewalks (see Figure 4.37).

4.3.11 Platforms

Seen from the survey findings below, survey participants found the platforms large enough to accommodate passengers waiting for trains as well as to promote easy walkability. Majority of participants at all segments noted this.

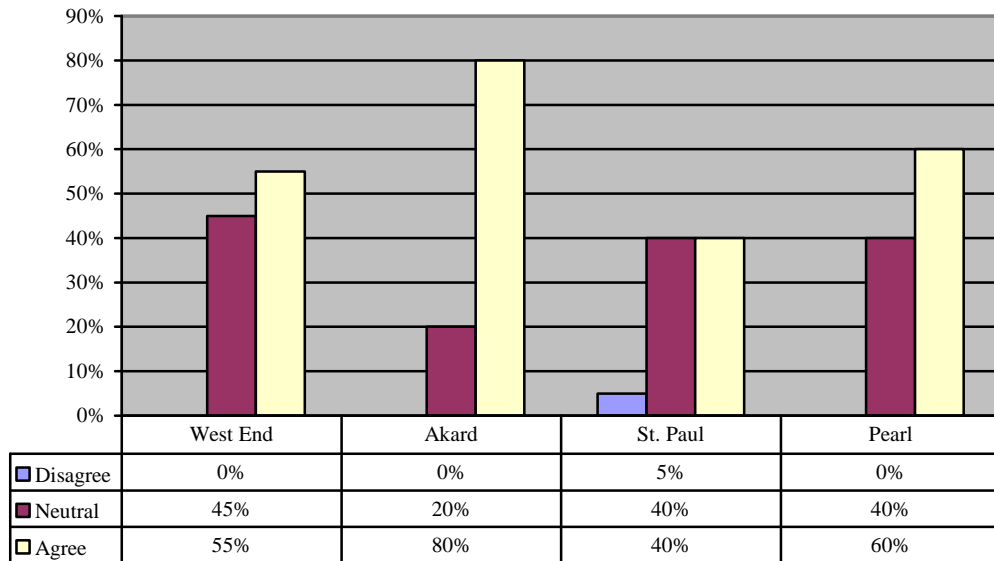


Figure 4.38 Platforms easily Accommodate Rush Hour Pedestrian Traffic

Passive observations were made at various times of the day during weekdays and weekends. Large crowds of Texas and Oklahoma University fans take the DART rail on game day. The West End segment platform easily accommodates these large crowds, as do nearby restaurants. Crowds larger than the game day crowd were not observed on any of the segments during passive observation.

The Regional Mobility Initiatives studied the transitway mall area for the presence of sidewalks. Through GIS maps, the study shows the existing and recommended sidewalks. It was observed from these maps that no recommendations were made for any of the transitway mall sidewalks. The Regional Mobility Initiatives found sidewalks in the transitway mall to be adequately wide and well maintained.

4.3.12 Fenestration

The bar chart below (Figure 4.39) displays the role of fenestration—that is, windows and doorways—toward creating a good walking experience for pedestrians. According to the survey findings, a maximum number of participants in the Pearl segment disagreed with the statement about the fenestration in that segment. On the contrary, a majority of participants appreciated the fenestration in the West End segment.

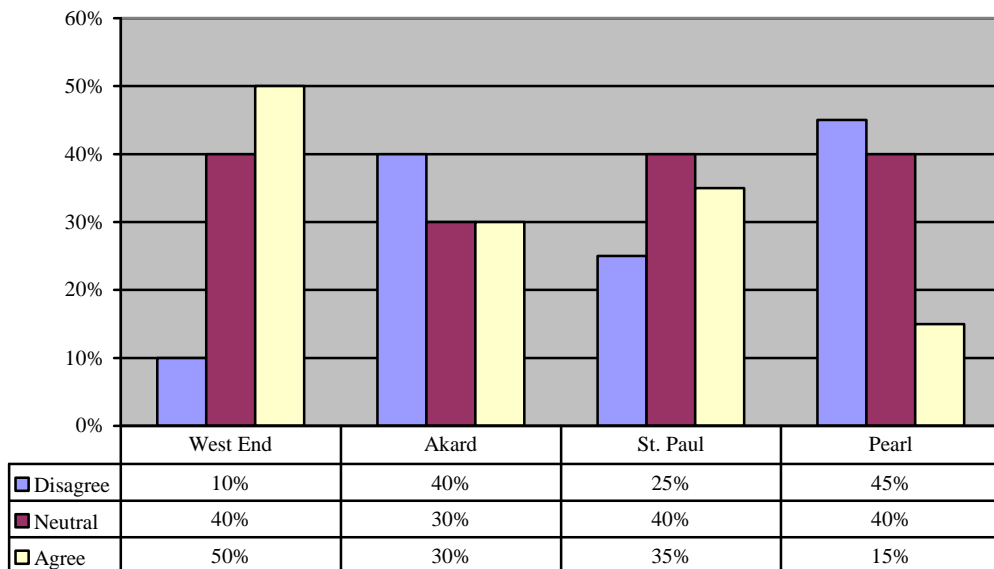


Figure 4.39 Fenestration Provides a Good Walking Experience

Fenestration along the transitway mall was observed. The Dallas High School building is located on one side of Pearl Station (see Figure 4.40). This school is closed down, and construction work has begun on the premises; therefore, fenestration along this segment is dull and drab. It was observed that the fenestration along the Pearl, St.

Paul, and Akard segments is not interesting enough to enhance the pedestrian walking experience.



Figure 4.40 Fenestration along the Pearl segment

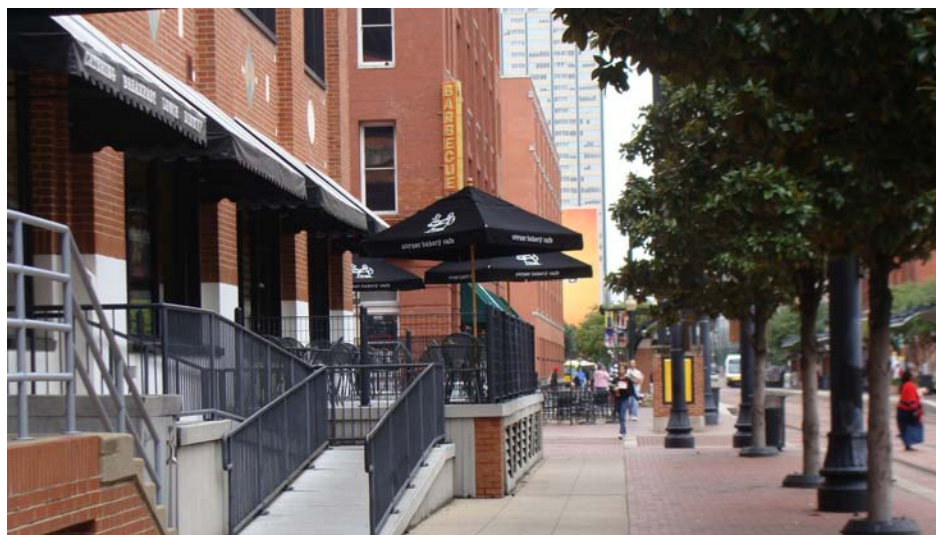


Figure 4.41 Fenestration along the West End Segment

The West End segment was observed to have pedestrian-scaled fenestration (see Fig 4.41). There are few blank facades along this segment. The presence of windows of different sizes and shapes make the façade interesting for pedestrians.



Figure 4.42 Mural Art at the Pearl Segment

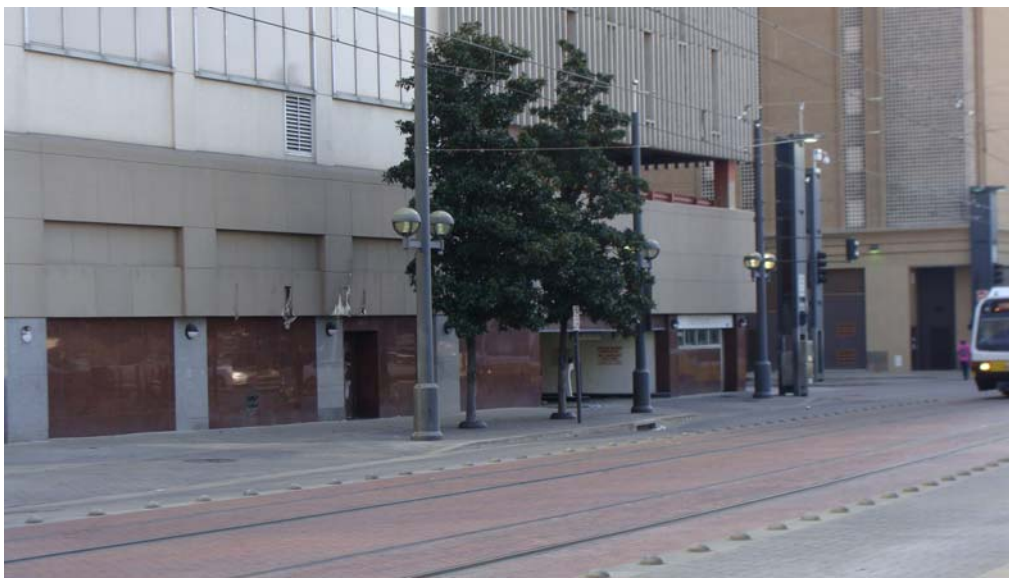


Figure 4.43 Blank Facades along the Akard Segment

4.3.13 Store Windows

A majority of the survey participants disagreed to the survey statement on store windows. The participants observed that there are almost no store windows along the transitway malls. The survey findings are reflected in the Figure 4.44, below.

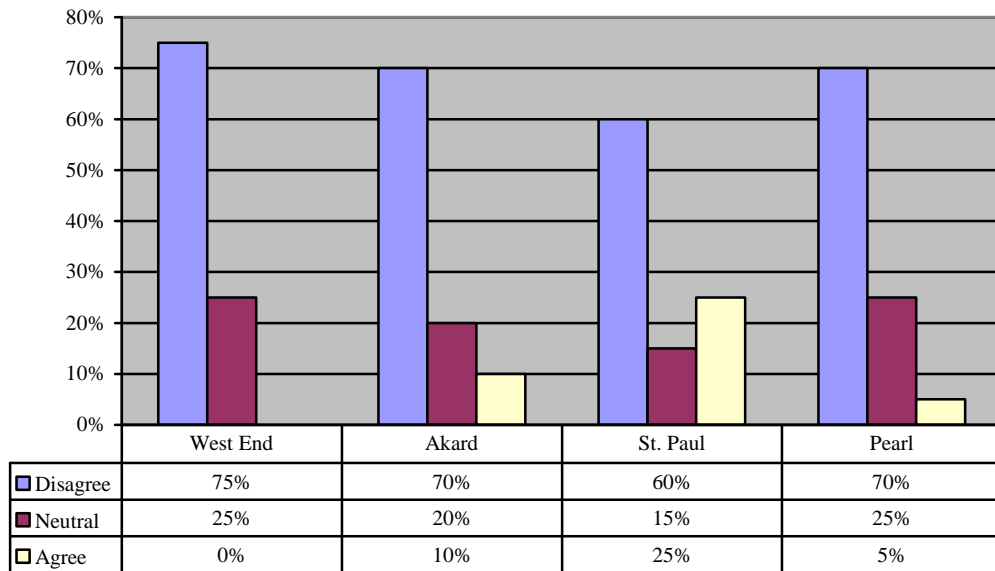


Figure 4.44 Display of Goods in the Store Windows add to the Walking Experience



Figure 4.45 Store Window at the Akard Segment

There are three stores along the entire length of the transitway mall, and the store in Figure 4.45) is the only one with a window display.

4.3.14 Scale and Proportion of Buildings

The scale and proportion of the buildings vary for each segment of the transitway mall. About 65% of the survey participants agreed that the scale and proportion of buildings in the West End segment creates a good walking experience for pedestrians (see Figure 4.46). On the contrary, only 20% agreed (70% disagreed and 10% were neutral) about the scale and proportion of the buildings on the streets in the Pearl segment.

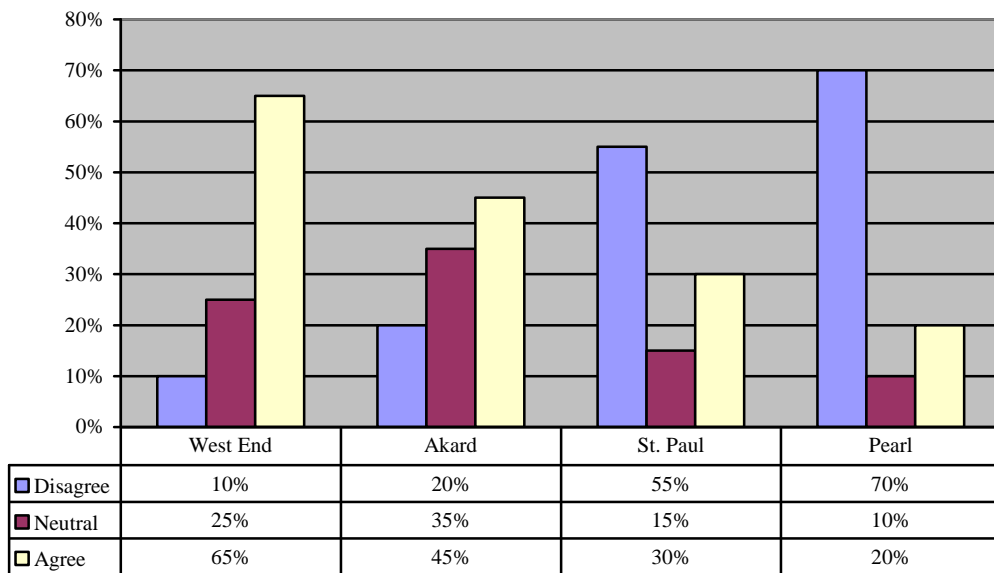


Figure 4.46 Scale and Proportion of the Buildings to the Streets create a Good Walking Experience

St. Paul Station is bound by multi-storied building on both sides (see Figure 4.47) and is always shaded by these buildings. This station never seems bright and open

like the other stations. Even the connecting bridges shade the area. Many participants remarked that this segment is very different from the other segments due to the tall buildings. The proportion of the buildings at the West End segment relate to the pedestrian scale (see Figure 4.48).



Figure 4.47 Scale of the Buildings at the St. Paul Segment



Figure 4.48 Scale of the Buildings at the West End Segment

4.3.15 Canopies and Awnings

The survey responses for the overhead structures varied for each segment of the transitway mall. According to survey findings, the St. Paul segment has overhead structures providing adequate weather protection (see Figure 4.49). The overhead structures in the Akard segment are considered inadequate for weather protection, according to participants.

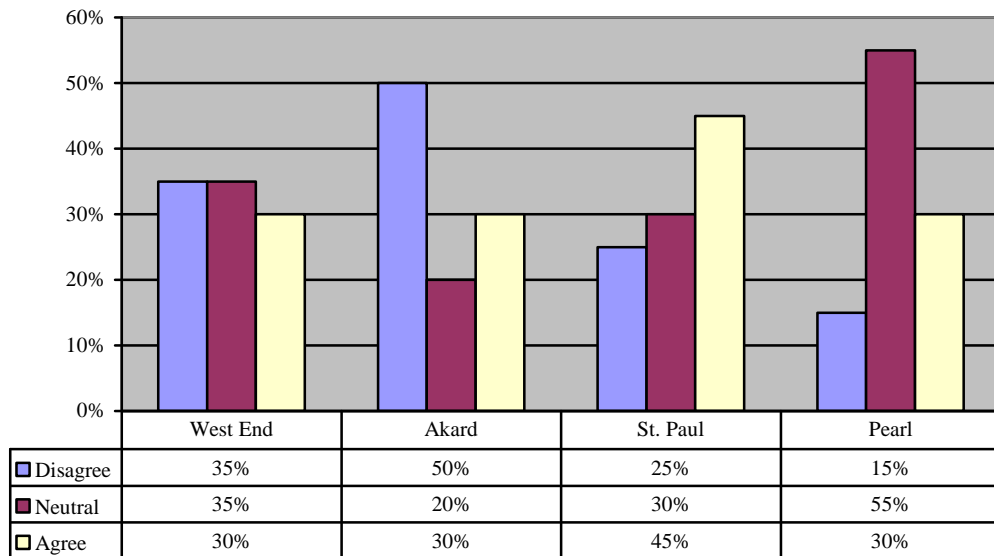


Figure 4.49 Overhead Structures Provide Adequate Weather Protection in this Segment



Figure 4.50 Overhead Structure at West End Station

There are eight canopies for each station in the transitway mall. Figure 4.50 displays the canopy at West End Station. These canopies provide some protection from the weather.

4.3.16 Curb-cuts and Ramps

According to the survey findings, about 80% to 90% of participants agreed to the efficient designs of the curb cuts and ramps and found them to adhere to ADA standards (see Figure 4.51).

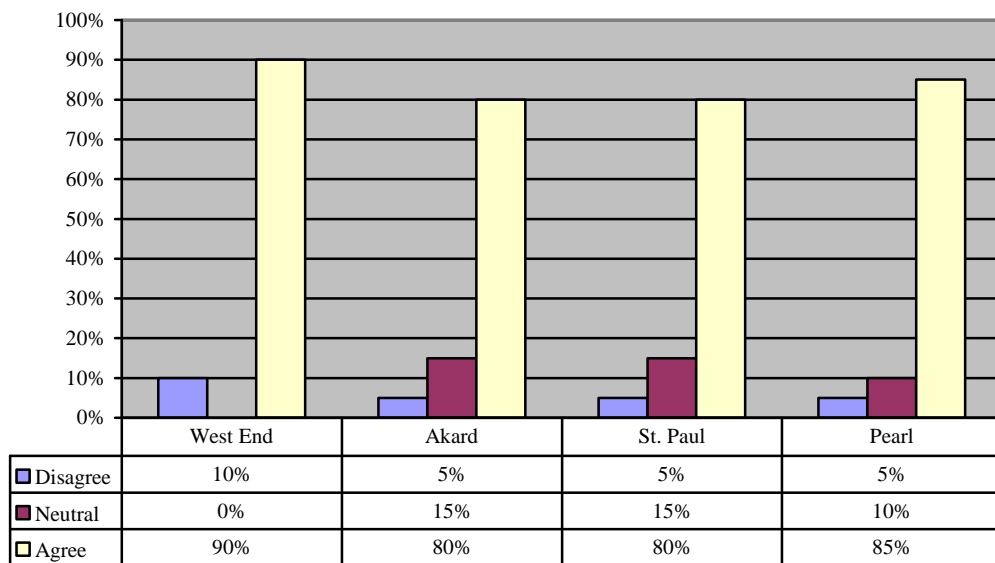


Figure 4.51 Curb-cuts and Ramps are Well Designed to Promote Accessibility

Passive observation showed that two boarding ramps (Figure 4.52) are provided at each station in the transitway mall. Every station platform ends in a ramp to join the street level. Curb ramps, wherever necessary, are provided according to the ADA standards. One of the survey participants was a wheelchair user, who found ramps and

curb ramps wherever required (see Figure 4.53). The participant said that he was extremely happy with the accessibility throughout the transitway mall.



Figure 4.52 Boarding Ramp at Pearl Station



Figure 4.53 Curb Ramps at the St. Paul Segment

The Regional Mobility Initiatives studied the transitway mall area for the presence of curb cuts. The GIS map below (Figure 4.54) shows curb cuts that existed as of February 1993. Passive observation used these GIS maps to compare with the present curb cuts. It was observed that needed curb cuts, as specified by the Regional Mobility Initiatives study, have been made.

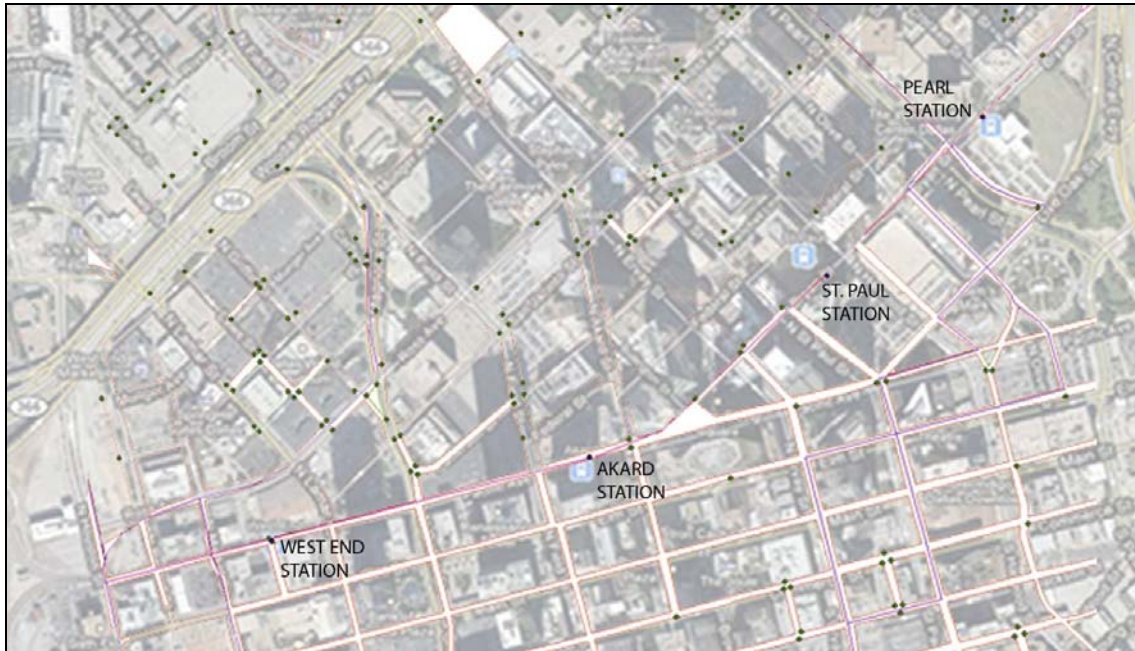


Figure 4.54 Regional Mobility Initiatives Map Showing Existing Curb Cuts

4.3.17 Maintenance

Survey findings showed a majority of the survey participants felt that all the segments of the transitway mall are well maintained (see Figure 4.55).

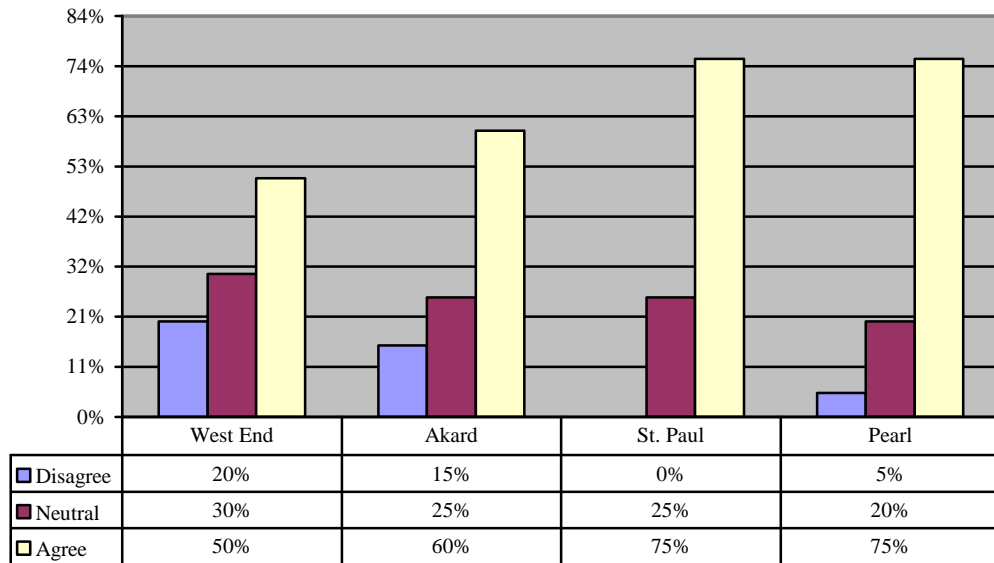


Figure 4.55 This Segment of the Mall is Well Maintained

It was observed during passive observation that most parts of the mall are well maintained. A few design elements that require maintenance were observed in some segments (see Figure 4.56).



Figure 4.56 Maintenance Needed along the Akard Segment

4.3.18 Open-ended Questions

Section B of the survey asked a second open-ended question for each mall segment. The question common to all the four segments: *“Is there anything else you wish to comment on, that was not addressed previously?”*

These written responses to the open-ended questions allowed participants to express their comments and compliments on the design elements. Seventy-five percent of the survey participants did not answer to the open-ended questions. However, 25% of the participants commented on several topics. The opportunity to speak freely about topics of interest to the participants, allowed researchers the ability to gain insight into which topics are important to the designers. The comments of the participants as separated by the segments are shown below.

Comments on the West End segment:

I felt uneasy due to the threatening nature of the locals.

Need restrooms. Lamar to Griffin is bad.

It has parking lots on both sides, for most part, making it boring.

Need restrooms.

Comments on the Akard segment:

Section feels dirty and empty. Crossing from Thanksgiving square is dangerous.

Relation of the Thanksgiving square to the street is dead. 4” pavers at Ervay crossing are set too wide with dangerous gaps. Need restrooms.

It needs food sources and vendors.

Need restrooms.

ADA access to the train should be improved.

Comments on the St. Paul segment:

Harwood side is better. No restrooms.

Surface is not even.

Need restrooms.

Between Harwood Street and Olive Street: scale and fenestration of the buildings is better than rest of the stretch.

Vegetation in this part is good, provides sufficient shade which adds to the walking experience.

Comments on the Pearl segment:

It needs more vegetation. It is too open.

4.4 Overview of the Research Findings

A total of twenty design professionals took the walkability and accessibility walkthrough survey at the downtown transitway mall. Out of these twenty participants, 65% were males and 35% were females. About 35% of the survey participants were students, while the remaining 65% was distributed among landscape architects (25%), architects (20%), and urban designers (20%).

The survey findings on the transitway mall showed that only 35% of the participants visit the mall for activities other than riding DART. The remaining 65% do not visit the mall. Out of all the participants, the majority (35%) of the people visited the mall one to two times a month.

The survey findings demonstrated a list of design elements that are considered crucial for the walkability and accessibility of the transitway mall. Accessibility topped this list, with 50% of the participants regarding it the most crucial element of urban spaces. Accessibility was followed by building façade, food sources, seating, signage, and vegetation.

The survey responses on the most-liked pedestrian space varied for almost each participant. The commonality among these responses was the recognizable feature of these spaces. Most pedestrian spaces were appreciated for their proximity to good restaurants.

The analysis of the walkability and the accessibility data demonstrated the findings for individual design elements in the transitway mall. These findings from the three research methods are shown below. The Regional Mobility Initiatives data were available only for curb cuts and sidewalks in the transitway mall. There were no data regarding the other elements of the transitway mall.

Vegetation: Survey results and passive observations showed that the lush green vegetation in St. Paul's segment creates a good walking experience for pedestrians, while the vegetation in the Akard segment does not benefit the walking experience. The reason given is that the Akard segment does not have adequate canopy trees and the landscape is not well maintained.

Food sources: Survey results showed that 70% of the participants liked the presence of restaurants in the West End segment. They also felt that the outdoor seating for these restaurants creates a good walking experience. The West End segment was

also mentioned by two participants as the most-liked pedestrian-oriented urban space because of its restaurants. The participants criticized the restaurants in other segments as being inconspicuous to pedestrians and not having outdoor seating. Thus, these restaurants do nothing to enhance the walking experience. The passive observation of the mall reinforced these findings.

People: Survey participants felt that the presence of people on the West End, Pearl, and Akard segments attracts other pedestrians to these places. But some participants who visited the mall on game day felt the opposite because of the large number of drunken teenagers. A lack of pedestrians, as well as DART passengers, at the Pearl segment does not create a good walking experience. Participants found this place unsafe for walking.

Artwork: The survey results showed that the artwork in the St. Paul and Pearl segments was appreciated by most participants, while the participants did not enjoy the artwork at the West End and Akard Stations. The appreciated artwork is well located to be seen and enjoyed by pedestrians. On the contrary, the criticized artwork is wrongly located where they cannot be seen easily.

Water features: It was observed through survey results and passive observation that the water features in the transitway mall do not enhance the walking experience. This is due to their inconspicuous locations.

Signage: The survey results as well as the passive observation showed that there is enough signage throughout the transitway mall. The signage is also aptly located.

Lighting: Lighting is adequately provided in the transitway mall, as inferred from the survey findings and passive observation.

Surface material: It was demonstrated through the survey findings and passive observation that the surface materials are efficient for walking and also for wheelchair navigation. Mainly brick or concrete pavers are observed throughout the mall.

Seating: Findings from the survey and passive observation showed that there is adequate seating in the station areas of the mall. However, the areas between the two stations lack seating. The only exceptions to this are the Pearl and S. Paul segments that have enough seating between stations. Most participants appreciated this.

Street furniture: It was inferred from the survey findings and passive observation that there is adequate street furniture in all segments of the transitway mall to fulfill the functional requirements. A detailed spreadsheet on the street furniture can be found in Appendix A.

Platforms: It was demonstrated through the survey findings and passive observation that the platforms accommodate large numbers of pedestrians. They are adequately wide and feature slip-resistant paving at the edges for passenger safety. The Regional Mobility Initiatives studied the transitway mall area for the presence of sidewalks. However, it was observed from the passive observation that the sidewalk improvements as specified by the Regional Mobility Initiatives study have been completed.

Fenestration: It was inferred from the two research methods that fenestration impacts the walking experience of pedestrians. The fenestration along the West End segment is appreciated for its brickwork and window placements. The presence of first-floor restaurants with outdoor seating enhances the pedestrian experience. However, blank facades between the segments were criticized by all participants.

Store windows: The survey results and the passive observation showed that there are almost no store windows along the transitway mall. Participants mentioned that the presence of store windows facing the mall would enhance their walking experience.

Scale and proportion of the buildings: The scale and proportion of the buildings varied for each segment; the transitway mall showed districts of distinct character. The buildings at the West End segment were 4 to 6 stories high with brick facades and ample windows; most participants favored the scale and proportion of these buildings. Blank facades with no setbacks and fenestration are features of the Pearl segment; survey participants criticized the scale and proportion of these buildings.

Canopies and Awnings: Station area canopies provide adequate weather protection, according to the survey findings. Awnings outside restaurants in Pearl segment make the eateries inviting and are scaled for pedestrians.

Curb cuts and ramps: There are adequate curb cuts and ramps, as inferred by the surveys and passive observation. The Regional Mobility Initiatives studied the transitway mall area for the presence of curb cuts. It was observed from the passive

observation that the necessary curb cuts specified by the Regional Mobility Initiatives study have been done.

Maintenance: The survey findings as well as the passive observation showed that most parts of the transitway mall are well maintained. However, a few participants felt that the Akard segment is not maintained well.

The overall findings for the design elements in the transitway mall are shown in Figure 4.61. Overview of findings for each of the four segments, are shown as charts below.

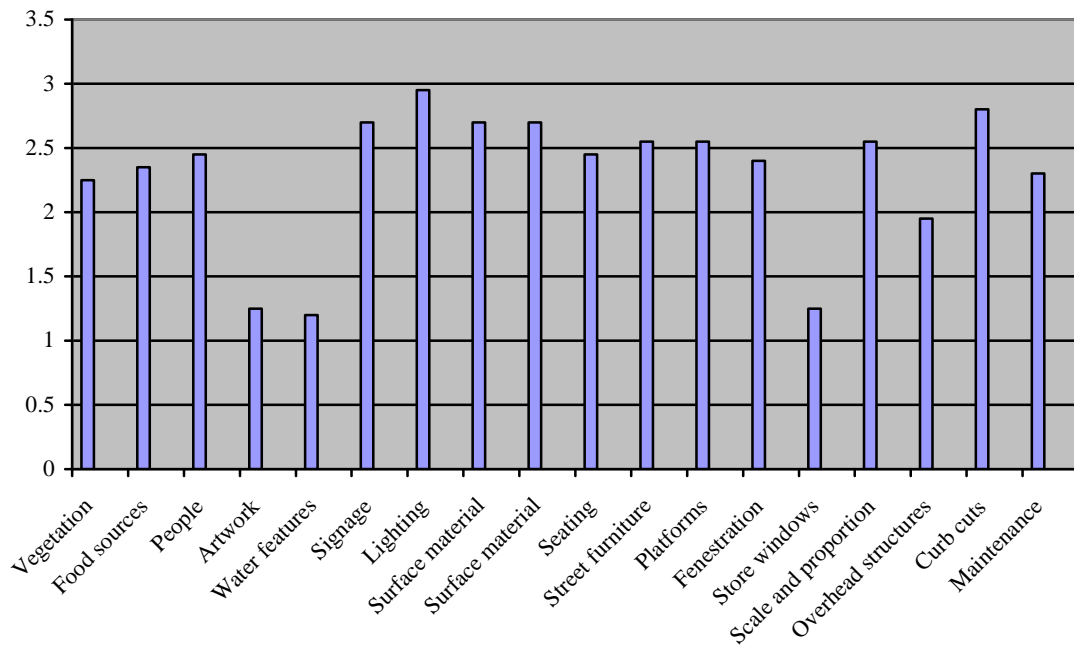


Figure 4.57 Overview of Findings for the West End Segment
 Legend: 0-1:Dis-agree 1-2: Neutral 2-3: Agree

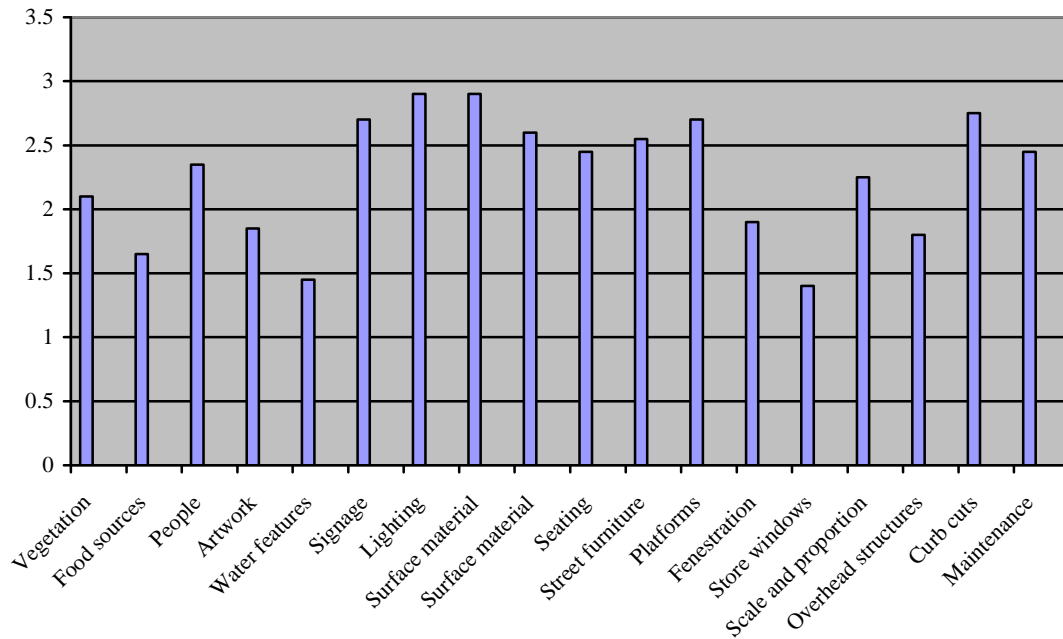


Figure 4.58 Overview of Findings for the Akard Segment
 Legend: 0-1:Dis-agree 1-2: Neutral 2-3: Agree

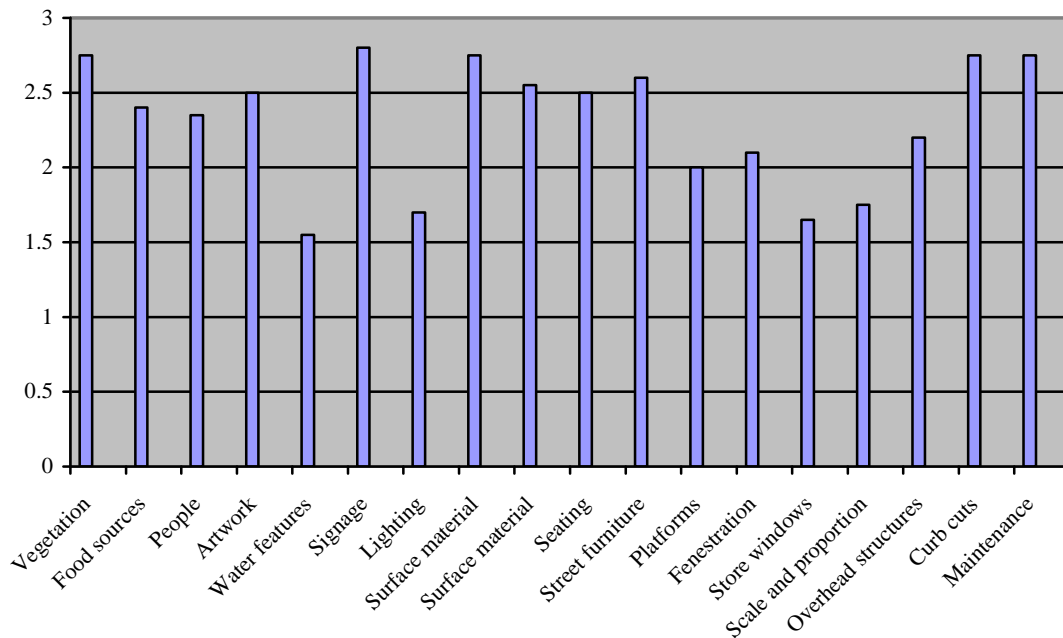


Figure 4.59 Overview of Findings for the St. Paul Segment
 Legend: 0-1:Dis-agree 1-2: Neutral 2-3: Agree

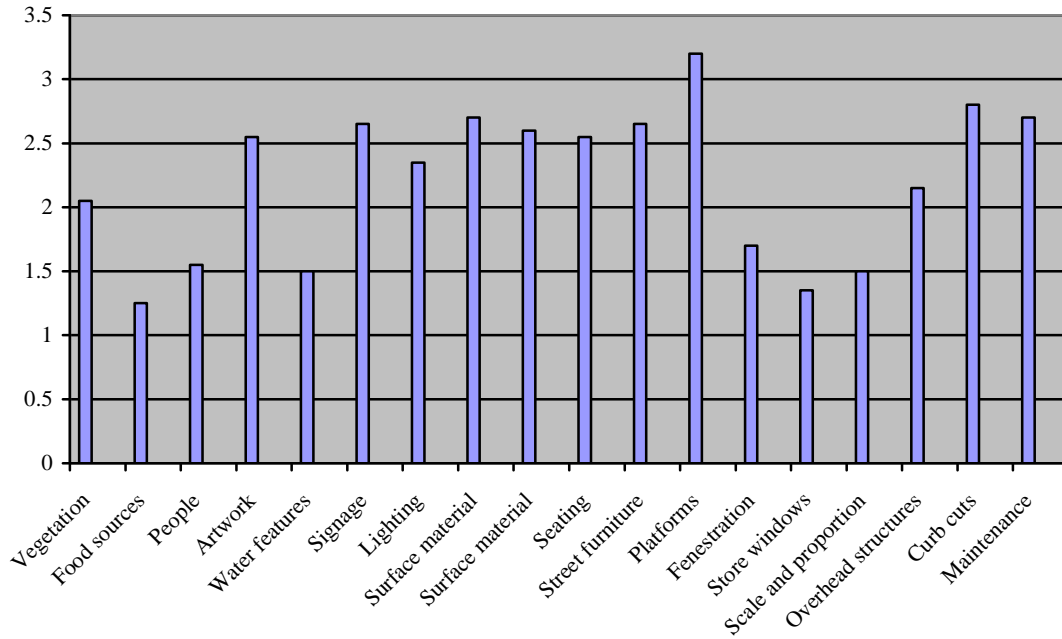


Figure 4.60 Overview of Findings for the Pearl Segment
 Legend 0-1:Dis-agree 1-2: Neutral 2-3: Agree

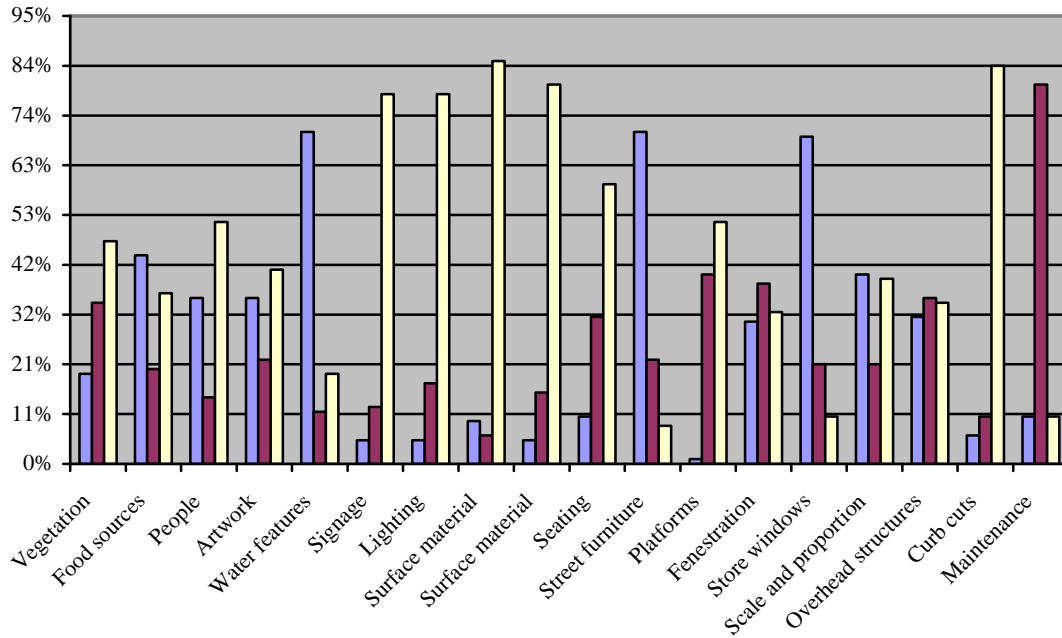


Figure 4.61 Overview of Findings for the Transitway Mall

4.5 Chapter Summary

This chapter on research findings started with an overview of the research methods. The survey data was then discussed by category. The profile information of the survey participants was displayed first, and then the participants' perceptions of the urban transit mall were noted. The open-ended questions from Section B of the survey questionnaire were also discussed. Bar charts, photographs, and descriptions were used to convey the walkability and accessibility analysis of the transitway mall. Under the Walkability and Accessibility Analysis section, each design element was discussed individually and the findings from the three methods on those elements were noted. Photographs taken during passive observation were used here along with bar charts to explain all the findings. The open-ended question from Section B was then discussed with participants' comments. The conclusions derived from these research findings will be demonstrated in Chapter 5.

CHAPTER 5

CONCLUSION

After analyzing the data from research findings, this research identifies the key design elements that impact the walkability and accessibility of the transitway mall. This chapter looks at these key elements and demonstrates the value of this research to landscape architects. The topics for future research are suggested.

5.1 Conclusions

The purpose of the study was to evaluate the walkability and accessibility of the downtown transitway mall by documenting and analyzing its design elements.

The objectives of this study were to:

1. To determine the design elements, which are most critical to the walkability and accessibility of the transitway mall, from a designers' perspective.
2. To determine how these design elements impact the walking experience of pedestrians.
3. To analyze the improvements needed to the transitway mall to enhance its walkability and accessibility.

To achieve these research objectives, the following processes were adopted:

1. Extensive literature review was conducted to determine the crucial design elements, which impact the walkability and accessibility of urban spaces.

2. Three research methods were used for this study. The methods included walkthrough surveys, passive observations, and utilization of the Regional Mobility Initiatives data.
3. The design element matrix created from the literature review was analyzed and used to frame survey questions. The matrix was also used for passive observation at the transitway mall.
4. The analyses and findings from the three research methods is triangulated using data triangulation to determine the conclusions of this research.

The lessons learned from the transitway mall case, after using these research processes are presented below.

5.2 Lessons Learned from the Transitway Mall

This research aimed at identifying the design elements, which are most critical to the walkability and accessibility of pedestrians along the transitway mall. Six key design elements were identified from the findings. The survey analysis, along with the passive observation, resulted in this key design element list:

Accessibility - Building façade - Food sources – Seating – Signage – Vegetation

Fig 5.1 below shows the survey findings for these six elements with reference to the transitway mall.

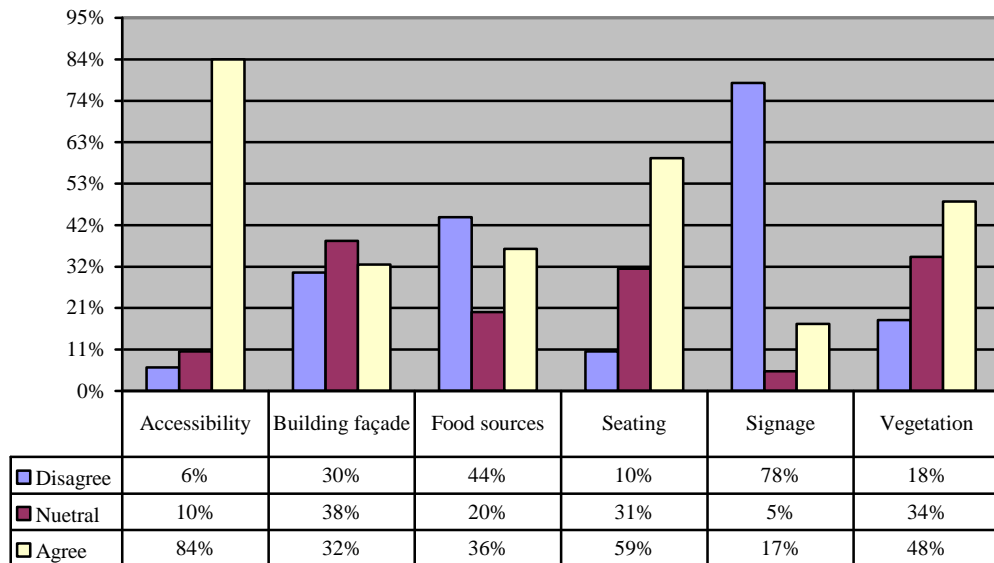


Figure 5.1 Transitway Mall Findings for the Six Design Elements

The impacts of these elements on the walkability and accessibility of the transitway mall are mentioned below:

Accessibility: Accessibility is crucial as it makes the design universal. An accessible design can be used by all people despite any disabilities. The findings overview pointed out that twenty-five percent of the design professionals considered accessibility to be the most important element affecting the pedestrian experience of the transitway mall.

Building facade: Most of the survey participants pointed out that the building facades needed considerable improvement in order to enhance the walking experience. Blank facades are dull and boring and do not indulge the pedestrian while walking. On the contrary, buildings with fenestration engage the pedestrians thus enhancing their walking experience.

Food sources: Majority of the survey participants commented on the food sources in the transitway mall. Participants liked the West End station for the numerous restaurants there with outdoor seating. Forty-five percent of the survey participants said they visited the mall for dining purposes. Restaurants with outdoor seating create a lively atmosphere to attract other pedestrians.

Seating: The presence of adequate seating areas in walkable places is crucial (Scully and Schmitz, 2005). The station areas of the transitway mall were observed to have adequate seating. Seating areas in the transitway mall were used not only by passengers waiting for trains, but so by people from neighboring buildings to have lunch or casual chats.

Signage: Signage was considerably important at an urban space with public transportation. Without proper signage, pedestrians will have no clue about the train routes and directions. The transitway mall had efficient signage according to research findings. The kiosks displaying CBD maps were located at each station.

Vegetation: Lack of vegetation in certain segments prompted the survey participants to call the stretch dull and lifeless. Presence of shaded trees and vegetation was always welcomed by the participants during the walkthrough survey. One of the participants had remarked that the presence of lush green between St. Paul and Pearl station made the survey a memorable experience.

Though the participants liked certain aspects of the transitway mall, there is still room for improvement to make it extremely pedestrian friendly.

5.3 Suggestions for the Transitway Mall

The West End segment was most liked by the survey participants. The only suggestion, which erupted from the findings and analysis was the appropriate placement of artwork. Addition of artwork or water features in this segment would enhance the pedestrian walking experience.

The Akard segment lacked canopy trees. The existing trees were not maintained well. Even the planting beds were not maintained. Also, addition of artwork and water features would enhance the pedestrian walking experience in this segment. The fenestration of this segment also needs to be thought of. The blank facades should be decorated with planters and vines to enhance the pedestrian walking experience.

A pedestrian scale should be achieved in the St. Paul segment by provision of canopies and planters. The tall buildings in this segment create a hindrance to the overall scale and proportion. Also, the buildings cast a shade, depriving the station area from sunlight. This issue needs to be tackled.

The Pearl segment could do with more vegetation, artwork and control of scale and proportion. The store windows should be enhanced to increase the pedestrian walking experience. The black facades and buildings under construction should be tackled to create a pedestrian friendly experience in this segment.

Overall, the entire transitway mall was accessible with the provision of curb-cuts and ramps at necessary places.

5.4 Value of the Study to Landscape Architects

Landscapes work in tandem with a building's architecture, complimenting it (Newton, 1971). Landscape Architecture is the profession which applies artistic and scientific principles to the research, planning, design, and management of both natural and built environments. The resulting environments shall serve useful, aesthetic, safe and enjoyable purposes (Rogers, 1997). The relationship between architects, landscape architects, and urban planners is significant because it showcases the compatibility between the interrelated disciplines and details some career relationships. I.M.Pei and Henry Moore collaborated on several built landscapes throughout their working lives. These associations show how much influence the design fields have on one other.

It is recommended that a joint class between the programs of architecture, landscape architecture, and urban planning be planned to execute further urban design projects. The built environments are a result of multiple design professions and the exploration will be of benefit to all design students.

Familiarity with the transitway mall's development, since the past thirteen years, provides a through and in-depth analysis of urban transit-oriented spaces. Urban built environments such as the transitway mall are designed by a team of architects, landscape architects, urban designers etc. This study communicates the views of design professionals to the landscape architects. Architects, landscape architects and urban designers- all have a varied perspective on design. Understanding these perceptions helps future projects like the downtown transitway mall.

5.5 Future Research

This research concentrated on the design elements of the transitway mall and their impact on the walkability and accessibility. Future research topics are:

1. What is the perception of walkability and accessibility of the transitway mall from users perspective?
2. What are the factors, besides the design elements and how do they impact the pedestrian walking experience?
3. Evaluation of the walkability and accessibility from the transitway mall district to prominent districts in the CBD
4. How is the Dallas transitway mall different from other successful malls such as the 16th street mall in Denver, CO?
5. Functional differences between transit malls and other urban spaces.
6. Study of different types of malls mentioned in this thesis.
7. Study of cities without public transportation such as Arlington, TX.

APPENDIX A

PASSIVE OBSERVATION DATA

Table A.1 Passive Observation chart for West End Segment

No.	Design Elements	Are these elements present in the segment?	Quantity	Notes
1.	Artwork	Yes	2	One was a clock piece and the other was the map of the transitway mall with the West End segment highlighted.
2.	Building proportion	Yes	-	Most buildings seemed proportionate.
3.	Canopies and awnings	Yes	-	The station area had eight canopies with seating beneath. The restaurant windows had colorful awnings.
4.	Curbs and ramps	Yes	-	Curb cuts were observed at all intersections. This segment had two boarding ramps, one on either side.
5.	Fenestration	Yes	-	Ample windows were observed.
6.	Food sources	Yes	4	Three restaurants with outdoor seating.
7.	Lighting	Yes	45	The design of the light fixtures suited the historic West End district.
8.	People	Yes	-	This station was the most crowded of the four stations.
9.	Seating	Yes	103	Two types of seating were provided: one was a three seater bench and the other was one seater, using the canopy columns as backrest.
10.	Signage	Yes	15	Regulatory as well as informational signage was observed.
11.	Store windows	Yes	-	Just one store, but the store window was not appealing to the pedestrians.
12.	Street furniture-Trash cans	Yes	20	Metal trash cans were appropriately located, though all people did not use them.
	Street furniture-Ticket booth	Yes	4	Two ticket booths on either side seemed enough for the passengers.
	Street furniture-Phone booth	Yes	2	Two phone booths to make assistance calls, one on each side.
	Street furniture-Information kiosk	Yes	2	The information kiosk had DART rail map, and train schedules.
13.	Surface material	Yes	-	Brick and concrete pavers were used as surface material.
14.	Vegetation	Yes	60	Shaded canopy trees and planters with colorful annuals.
15.	Water features	Yes	1	One water feature was observed at the intersection of Pacific Avenue and Lamar Street

Table A.2 Passive Observation Chart for Akard Segment

No.	Design Elements	Are these elements present in the segment?	Quantity	Notes
1.	Artwork	Yes	2	One was a clock piece and the other was the map of the transitway mall with the West End segment highlighted.
2.	Building proportion	Yes	-	Buildings did not look proportionate to the transitway mall. The huge arches on one side were un-appropriate for a pedestrian scale.
3.	Canopies and awnings	Yes	-	The station area had eight canopies with seating beneath.
4.	Curbs and ramps	Yes	-	Curb cuts were observed at all intersections. This segment had two boarding ramps, one on either side.
5.	Fenestration	Yes	-	Parking lots and buildings with blank facades were observed.
6.	Food sources	Yes	2	Restaurants were inconspicuously located and did not have outdoor seating.
7.	Lighting	Yes	40	The design of the light fixtures was appropriate for the Akard station.
8.	People	Yes	-	10-15 people were observed during off-peak hours and 80-120 during peak hours
9.	Seating	Yes	95	Two types of seating were provided: one was a three seater bench and the other was one seaters, using the canopy columns as backrest.
10.	Signage	Yes	20	Regulatory as well as informational signage was observed.
11.	Store windows	Yes	-	Just one store, but the store window was not appealing to the pedestrians.
12.	Street furniture-Trash cans	Yes	12	Trash cans overflowed with litter. Some trash cans had damaged lids. Some planters were used as trash cans.
	Street furniture-Ticket booth	Yes	4	Two ticket booths on either side seemed enough for the passengers.
	Street furniture-Phone booth	Yes	2	Two phone booths to make assistance calls, one on each side.
	Street furniture-Information booth	Yes	2	The information kiosk had DART rail map, and train schedules.
13.	Surface material	Yes	-	Decorative granite pavers were used under the canopies.
14.	Vegetation	Yes	50	No canopy trees. The plant beds were barren.
15.	Water features	Yes	1	Thanksgiving Square water feature was hidden by a huge wall

Table A.3 Passive Observation Chart for St. Paul Segment

No.	Design Elements	Are these elements present in the segment?	Quantity	Notes
1.	Artwork	Yes	5	Along with the clock piece and the map of the transitway mall, few other art pieces were observed.
2.	Building proportion	Yes	-	The tall buildings towered over this segment and cast a shadow at all times.
3.	Canopies and awnings	Yes	-	The station area had eight canopies with seating beneath.
4.	Curbs and ramps	Yes	-	Curb cuts were observed at all intersections. This segment had two boarding ramps, one on either side.
5.	Fenestration	Yes	-	Glass-clad buildings with no openings
6.	Food sources	Yes	2	Restaurants without outdoor seating. But the presence of awnings made them pedestrian-scaled.
7.	Lighting	Yes	30	The design of the light fixtures was appropriate for the St. Paul station.
8.	People	Yes	-	5-10 people were observed during off-peak hours and 80-120 during peak hours
9.	Seating	Yes	90	Two types of seating were provided: one was a three seater bench and the other was one seater, using the canopy columns as backrest.
10.	Signage	Yes	20	Regulatory as well as informational signage was observed.
11.	Store windows	Yes	-	No stores were observed.
12.	Street furniture-Trash cans	Yes	15	Metal trash cans were appropriately located.
	Street furniture-Ticket booth	Yes	4	Two ticket booths on either side seemed enough for the passengers.
	Street furniture-Phone booth	Yes	2	Two phone booths to make assistance calls, one on each side.
	Street furniture-Information booth	Yes	2	The information kiosk had DART rail map, and train schedules.
13.	Surface material	Yes	-	Concrete pavers, a few intersections had wide spacing between the pavers causing a hindrance to wheelchair users.
14.	Vegetation	Yes	50	Not many canopy trees in this segment. But the station area is shaded most times due to the tall buildings.
15.	Water features	Yes	2	Water features along the segment.

Table A.4 Passive Observation Chart for Pearl Segment

No.	Design Elements	Are these elements present in the segment?	Quantity	Notes
1.	Artwork	Yes	3	Along with the clock piece and the map of the transitway mall, few other art pieces were observed.
2.	Building proportion	Yes	-	Building proportions were un-appropriate for a pedestrian scale. Also many blank facades were observed.
3.	Canopies and awnings	Yes	-	The station area had eight canopies with seating beneath.
4.	Curbs and ramps	Yes	-	Curb cuts were observed at all intersections. This segment had two boarding ramps, one on either side.
5.	Fenestration	Yes	-	Not much fenestration was seen along this segment
6.	Food sources	Yes	1	One restaurant which was completely inconspicuous.
7.	Lighting	Yes	35	The design of the light fixtures was appropriate for the Pearl station.
8.	People	Yes	-	5-10 people were observed during off-peak hours and 50-60 during peak hours
9.	Seating	Yes	80	Two types of seating were provided: one was a three seater bench and the other was one seaters, using the canopy columns as backrest.
10.	Signage	Yes	25	Regulatory as well as informational signage was observed.
11.	Store windows	Yes	-	No stores were observed.
12.	Street furniture-Trash cans	Yes	20	Metal trash cans were appropriately located.
	Street furniture-Ticket booth	Yes	4	Two ticket booths on either side seemed enough for the passengers.
	Street furniture-Phone booth	Yes	2	Two phone booths to make assistance calls, one on each side.
	Street furniture-Information booth	Yes	2	The information kiosk had DART rail map, and train schedules.
13.	Surface material	Yes	-	A combination of brick and concrete pavers.
14.	Vegetation	Yes	45	Not many canopy trees in this segment.
15.	Water features	Yes	2	Water features along the segment.

APPENDIX B

SURVEY QUESTIONNAIRE SAMPLE PAGES

Table B.1 Cover letter for survey

Evaluation of walkability and accessibility of DART's downtown transitway mall

Respondent # : _____

Dear fellow design professional,

I sincerely request your assistance in completing the attached questionnaire which is a part of my master's thesis for The University of Texas at Arlington, School of Architecture, Program in Landscape Architecture. The survey is designed to evaluate the walkability and accessibility of the Dallas Area Rapid Transit's (DART's) downtown transitway mall in Dallas, Texas.

The transitway mall is divided into four segments each including one light rail station. The survey requires the subject to walk through each of the four segments. A total distance of 1.2 mile needs to be walked for the survey. The first section asks demographic information for profile purposes only. There are nineteen questions for each segment in the second section. The first eighteen questions use the Likert scale to ask how much you agree or disagree with a particular statement. The last question is an open-ended question and requires your expert comments.

Your personal input as a design professional is crucial for the accomplishment of the research. It will take approximately thirty to forty-five minutes to complete the questionnaire while walking. I assure you that the identity of the respondents will be held in confidence. If you are interested in reading the final thesis, please email me at vaidehigupte@gmail.com.

I appreciate your valuable time and help.

Thank you,

Vaidehi Gupte

Student of the Masters Program
In Landscape Architecture
The University of Texas at Arlington

Table B.2 Sample of page one of the survey questionnaire

Evaluation of walkability and accessibility of DART's downtown transitway mall

Respondent # : _____

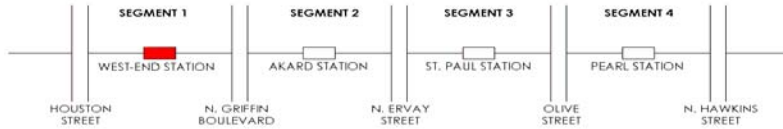
Section A

<p>1. What is your occupation?</p> <p style="padding-left: 20px;">Landscape architecture</p> <p style="padding-left: 20px;">Architecture</p> <p style="padding-left: 20px;">Urban planning</p> <p style="padding-left: 20px;">Student _____ (Please specify and then proceed to Question 2)</p> <p style="padding-left: 20px;">Other _____ (Please specify)</p>	<p>2. If you are a student, then how many design studios have you taken so far?</p> <p style="padding-left: 40px;">1 – 2</p> <p style="padding-left: 40px;">3 – 4</p> <p style="padding-left: 40px;">5 or more</p> <p style="padding-left: 40px;">None</p>		
<p>3. Do you visit this transitway mall for other activities besides riding the DART light rail?</p> <p style="padding-left: 20px;">Yes</p> <p style="padding-left: 20px;">No</p>	<p>4. What activities are you involved in at the transitway mall?</p>		
<p>5. How many times do you visit this transitway mall?</p> <p style="padding-left: 20px;">_____ times a month</p>	<p>6. Please specify your gender:</p> <p style="padding-left: 40px;">Male</p> <p style="padding-left: 40px;">Female</p>		
<p>7. Please rate the top five features of urban transit malls using a scale of 1 to 5 (1 being the most important and 5 being the least important)</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;"> <p>Accessibility _____</p> <p>Building facade _____</p> <p>Food sources _____</p> <p>Lighting _____</p> <p>People and activities _____</p> </td> <td style="width: 50%;"> <p>Sculptures/Water features _____</p> <p>Seating _____</p> <p>Signage _____</p> <p>Store windows _____</p> <p>Vegetation _____</p> </td> </tr> </table>		<p>Accessibility _____</p> <p>Building facade _____</p> <p>Food sources _____</p> <p>Lighting _____</p> <p>People and activities _____</p>	<p>Sculptures/Water features _____</p> <p>Seating _____</p> <p>Signage _____</p> <p>Store windows _____</p> <p>Vegetation _____</p>
<p>Accessibility _____</p> <p>Building facade _____</p> <p>Food sources _____</p> <p>Lighting _____</p> <p>People and activities _____</p>	<p>Sculptures/Water features _____</p> <p>Seating _____</p> <p>Signage _____</p> <p>Store windows _____</p> <p>Vegetation _____</p>		
<p>8. Please list one pedestrian oriented urban space that you like the most. Then please list the most recognizable feature or quality that you remember about this place from a walkability and accessibility standpoint.</p>			

Table B.3 Sample of page two of the survey questionnaire

Evaluation of walkability and accessibility of DART’s downtown transitway mall

Section B Segment one – Houston Street to N. Griffin Boulevard



Please provide your opinion on the following statements with reference to segment one.

No	Statements	Please circle the number that describes how you agree or disagree with the following statements.				
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1.	The vegetation in this segment provides a good walking experience along the transitway mall.	1	2	3	4	5
2.	The presence of food sources (vendors, coffee shops, and restaurants) creates a lively experience for pedestrians in this segment.	1	2	3	4	5
3.	The presence of people creates a lively atmosphere for other pedestrians in this segment.	1	2	3	4	5
4.	The fenestration (the arrangement of windows) along the façade provides a good walking experience in this segment.	1	2	3	4	5
5.	The display of goods in the store windows adds to the walking experience within this segment.	1	2	3	4	5
6.	The presence of art-work provides a good walking experience along this segment.	1	2	3	4	5
7.	The presence of water features provides a good walking experience in this segment.	1	2	3	4	5
8.	There is enough informational signage along this segment.	1	2	3	4	5
9.	The lighting in this segment seems adequate for walking after sunset.	1	2	3	4	5
10.	The surface material of the platform is efficient to promote walking.	1	2	3	4	5
11.	There is a sufficient amount of seating along this segment of the mall.	1	2	3	4	5
12.	There is sufficient street furniture (trash cans, bollards and information kiosks) to fulfill the functional requirements of pedestrians in this segment.	1	2	3	4	5
13.	Overhead structures like canopies and awnings provide adequate weather protection in this segment.	1	2	3	4	5
14.	The platforms easily accommodate rush hour pedestrian traffic in this segment	1	2	3	4	5
15.	The scale and proportion of the buildings to the streets create a good walking experience in this segment.	1	2	3	4	5
16.	The surface material is facilitates wheelchair navigation in this segment.	1	2	3	4	5
17.	The curb-cuts and ramps are well designed to promote accessibility (Please consider ADA standards) in this segment.	1	2	3	4	5
18.	This segment of the mall is well maintained.	1	2	3	4	5

Table B.4 Sample of page three of the survey questionnaire

Evaluation of walkability and accessibility of DART's downtown transitway mall

Section B Segment two –N. Griffin Boulevard to N. Ervay Street

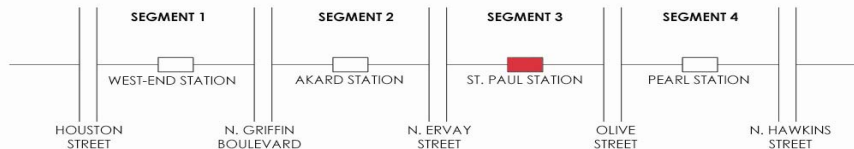
Please provide your opinion on the following statements with reference to segment two.

No	Statements	Please circle the number that describes how you agree or disagree with the following statements.				
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1.	The vegetation in this segment provides a good walking experience along the transitway mall.	1	2	3	4	5
2.	The presence of food sources (vendors, coffee shops, and restaurants) creates a lively experience for pedestrians in this segment.	1	2	3	4	5
3.	The presence of people creates a lively atmosphere for other pedestrians in this segment.	1	2	3	4	5
4.	The fenestration (the arrangement of windows) along the façade provides a good walking experience in this segment.	1	2	3	4	5
5.	The display of goods in the store windows adds to the walking experience within this segment.	1	2	3	4	5
6.	The presence of art-work provides a good walking experience along this segment.	1	2	3	4	5
7.	The presence of water features provides a good walking experience in this segment.	1	2	3	4	5
8.	There is enough informational signage along this segment.	1	2	3	4	5
9.	The lighting in this segment seems adequate for walking after sunset.	1	2	3	4	5
10.	The surface material of the platform is efficient to promote walking.	1	2	3	4	5
11.	There is a sufficient amount of seating along this segment of the mall.	1	2	3	4	5
12.	There is sufficient street furniture (trash cans, bollards and information kiosks) to fulfill the functional requirements of pedestrians in this segment.	1	2	3	4	5
13.	Overhead structures like canopies and awnings provide adequate weather protection in this segment.	1	2	3	4	5
14.	The platforms easily accommodate rush hour pedestrian traffic in this segment	1	2	3	4	5
15.	The scale and proportion of the buildings to the streets create a good walking experience in this segment.	1	2	3	4	5
16.	The surface material is facilitates wheelchair navigation in this segment.	1	2	3	4	5
17.	The curb-cuts and ramps are well designed to promote accessibility (Please consider ADA standards) in this segment.	1	2	3	4	5
18.	This segment of the mall is well maintained.	1	2	3	4	5

Table B.5 Sample of page four of the survey questionnaire

Evaluation of walkability and accessibility of DART’s downtown transitway mall

Section B Segment three –N. Ervay Street to Olive Street



Please provide your opinion on the following statements with reference to segment three.

No	Statements	Please circle the number that describes how you agree or disagree with the following statements.				
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1.	The vegetation in this segment provides a good walking experience along the transitway mall.	1	2	3	4	5
2.	The presence of food sources (vendors, coffee shops, and restaurants) creates a lively experience for pedestrians in this segment.	1	2	3	4	5
3.	The presence of people creates a lively atmosphere for other pedestrians in this segment.	1	2	3	4	5
4.	The fenestration (the arrangement of windows) along the façade provides a good walking experience in this segment.	1	2	3	4	5
5.	The display of goods in the store windows adds to the walking experience within this segment.	1	2	3	4	5
6.	The presence of art-work provides a good walking experience along this segment.	1	2	3	4	5
7.	The presence of water features provides a good walking experience in this segment.	1	2	3	4	5
8.	There is enough informational signage along this segment.	1	2	3	4	5
9.	The lighting in this segment seems adequate for walking after sunset.	1	2	3	4	5
10.	The surface material of the platform is efficient to promote walking.	1	2	3	4	5
11.	There is a sufficient amount of seating along this segment of the mall.	1	2	3	4	5
12.	There is sufficient street furniture (trash cans, bollards and information kiosks) to fulfill the functional requirements of pedestrians in this segment.	1	2	3	4	5
13.	Overhead structures like canopies and awnings provide adequate weather protection in this segment.	1	2	3	4	5
14.	The platforms easily accommodate rush hour pedestrian traffic in this segment	1	2	3	4	5
15.	The scale and proportion of the buildings to the streets create a good walking experience in this segment.	1	2	3	4	5
16.	The surface material facilitates wheelchair navigation in this segment.	1	2	3	4	5
17.	The curb-cuts and ramps are well designed to promote accessibility (Please consider ADA standards) in this segment.	1	2	3	4	5
18.	This segment of the mall is well maintained.	1	2	3	4	5

Table B.6 Sample of page five of the survey questionnaire

Evaluation of walkability and accessibility of DART’s downtown transitway mall

Section B Segment four – Olive Street to N. Hawkins Street

Please provide your opinion on the following statements with reference to segment four.

No	Statements	Please circle the number that describes how you agree or disagree with the following statements.				
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1.	The vegetation in this segment provides a good walking experience along the transitway mall.	1	2	3	4	5
2.	The presence of food sources (vendors, coffee shops, and restaurants) creates a lively experience for pedestrians in this segment.	1	2	3	4	5
3.	The presence of people creates a lively atmosphere for other pedestrians in this segment.	1	2	3	4	5
4.	The fenestration (the arrangement of windows) along the façade provides a good walking experience in this segment.	1	2	3	4	5
5.	The display of goods in the store windows adds to the walking experience within this segment.	1	2	3	4	5
6.	The presence of art-work provides a good walking experience along this segment.	1	2	3	4	5
7.	The presence of water features provides a good walking experience in this segment.	1	2	3	4	5
8.	There is enough informational signage along this segment.	1	2	3	4	5
9.	The lighting in this segment seems adequate for walking after sunset.	1	2	3	4	5
10.	The surface material of the platform is efficient to promote walking.	1	2	3	4	5
11.	There is a sufficient amount of seating along this segment of the mall.	1	2	3	4	5
12.	There is sufficient street furniture (trash cans, bollards and information kiosks) to fulfill the functional requirements of pedestrians in this segment.	1	2	3	4	5
13.	Overhead structures like canopies and awnings provide adequate weather protection in this segment.	1	2	3	4	5
14.	The platforms easily accommodate rush hour pedestrian traffic in this segment	1	2	3	4	5
15.	The scale and proportion of the buildings to the streets create a good walking experience in this segment.	1	2	3	4	5
16.	The surface material is facilitates wheelchair navigation in this segment.	1	2	3	4	5
17.	The curb-cuts and ramps are well designed to promote accessibility (Please consider ADA standards) in this segment.	1	2	3	4	5
18.	This segment of the mall is well maintained.	1	2	3	4	5

APPENDIX C
SURVEY DATA

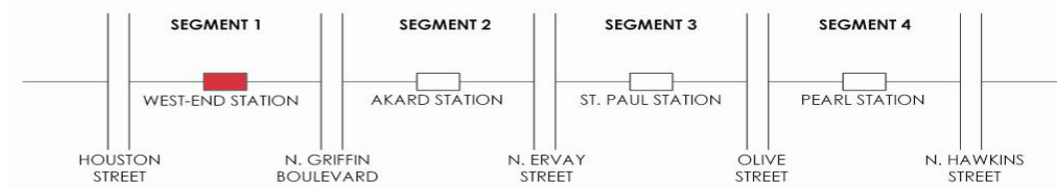
Table C.1 Survey Data Sheet

SURVEY DATA SHEET																	
SECTION A																	
Question Numbers																	
Survey No.	1	2	3	4	5	6	7										8
							A	B	C	D	E	F	G	H	I	J	
1.	D	C	B	NA	0	B	1	-	-	2	3	-	-	5	-	4	Powell Street at San Francisco, CA
2.	A	NA	B	Dining	2	A	2	3	2	2	1	3	3	3	4	3	West End station, Dallas, TX
3.	A	NA	A	Dining	1	A	1	-	-	3	5	-	4	2	-	-	3 rd Street promenade, Santa Monica, CA
4.	C	NA	A	Dining	0	B	1	4	1	1	2	5	1	1	3	1	Shinjuku, Kamakura, Tokyo, Japan
5.	A	NA	B	None	1	A	1	-	-	1	1	-	1	1	-	-	Millenium Park, Chicago, IL
6.	B	NA	B	None	0	B	5	1	3	5	4	3	5	5	1	2	Linking Road, Mumbai, Maharashtra, India
7.	D	C	B	Survey	0	A	2	-	-	4	5	-	3	1	-	-	Hyde Park, London, United Kingdom
8.	D	C	A	Dining	5	A	1	-	-	3	4	-	5	2	-	-	River-walk, San Antonio, TX
9.	D	C	B	To see 4 th of July fireworks	0	A	2	-	3	5	-	-	4	1	-	-	Berlin main station, Germany West End station, Dallas, TX
10.	C	NA	B	To take DART buses	20	B	4	3	5	5	4	2	3	4	3	4	Indian Habitat Center, Delhi, India

Table C.2 Survey Data Sheet Contd.

SURVEY DATA SHEET																	
SECTION A																	
Question Numbers																	
Survey No.	1	2	3	4	5	6	7										8
							A	B	C	D	E	F	G	H	I	J	
11.	B	NA	A	Dining	2	A	1	-	3	2	5	-	-	4	-	-	-
12.	B	NA	B	None	3	A	2	2	2	1	1	5	3	3	4	4	Thanksgiving Square, Dallas, TX
13.	B	NA	A	Dining	2	A	3	4	4	5	5	3	2	4	3	2	Link between The Modern on South bank of Thames St. Paul, London, UK
14.	C	NA	A	Dining	0	B	1	4	1	1	2	5	1	1	3	1	Hollywood Street, Los Angeles, CA
15.	D	C	B	Survey	0	A	2	-	-	4	5	-	3	1	-	-	Rockefeller Plaza, New York, NY
16.	A	NA	B	None	1	A	1	-	-	1	1	-	1	1	-	-	Bourbon Street, New Orleans, LA
17.	D	C	B	Dining	0	A	2	-	3	5	-	-	4	1	-	-	M Street, Washington DC
18.	D	A	B	None	0	B	1	5	3	2	4	5	2	1	5	1	Downtown Seattle, WA
19.	C	NA	B	To take DART buses	20	B	4	3	5	5	4	2	3	4	3	4	6 th Street, Austin, TX
20.	A	NA	A	Dining	1	A	1	-	-	3	5	-	4	2	-	-	The Strip, Las Vegas, NV

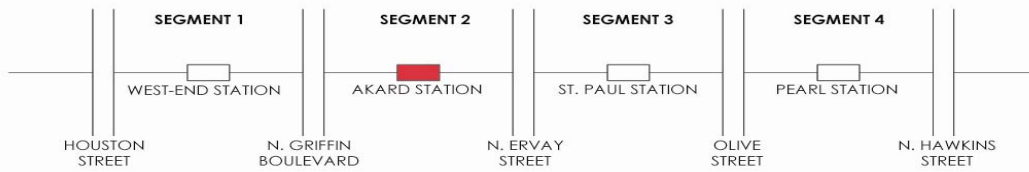
Table C.3 Transitway mall survey data for Section B- West End Segment



Rating Scale: Strongly disagree-1, Disagree-2, Neutral-3, Agree-4 and Strongly agree-5

SURVEY DATA SHEET																		
WEST END SEGMENT – HOUSTON TO N. GRIFFIN STREET																		
Question Numbers																		
Survey No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1.	3	4	4	3	2	2	2	4	4	4	4	4	3	3	4	4	2	3
2.	4	5	5	4	2	2	4	4	5	5	4	4	4	4	4	4	4	4
3.	4	5	3	3	1	3	2	4	4	4	4	4	2	4	3	4	4	2
4.	2	2	3	4	1	1	1	5	4	5	4	3	3	3	4	1	4	3
5.	4	3	4	4	2	2	2	4	4	4	4	4	4	4	4	4	4	4
6.	3	2	2	2	1	3	3	2	4	2	4	1	1	3	2	1	1	2
7.	3	4	4	4	3	3	1	5	5	5	2	4	2	3	3	5	4	3
8.	2	4	4	4	2	2	1	5	5	4	4	4	2	4	4	5	5	2
9.	4	5	4	3	3	2	2	3	4	4	4	4	4	5	4	4	4	5
10.	3	4	4	3	2	2	1	4	4	3	3	4	3	4	4	4	4	4
11.	3	4	5	4	2	1	1	4	4	2	2	3	3	4	4	4	4	4
12.	3	4	4	4	2	2	2	3	4	5	3	3	3	3	3	5	4	4
13.	3	2	4	2	1	3	2	3	4	4	4	3	1	3	4	4	4	3
14.	2	2	3	4	1	1	1	5	4	5	4	3	3	3	4	1	4	3
15.	3	4	4	4	3	3	1	5	5	5	2	4	2	3	3	5	4	3
16.	4	3	4	4	2	2	2	4	4	4	4	4	4	4	4	4	4	4
17.	4	5	4	3	3	2	2	3	4	4	4	4	4	5	4	4	4	5
18.	4	4	2	3	3	1	3	4	3	4	1	1	4	3	2	3	4	4
19.	3	4	4	3	2	2	1	4	4	3	3	4	3	4	4	4	4	4
20.	4	5	3	3	1	3	2	4	4	4	4	4	2	4	3	4	4	2

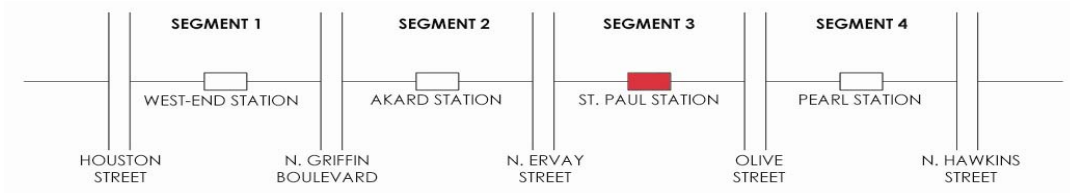
Table C.4 Transitway mall survey data for Section B- Akard Segment



Rating Scale: Strongly disagree-1, Disagree-2, Neutral-3, Agree-4 and Strongly agree-5

SURVEY DATA SHEET																		
SEGMENT TWO – N. GRIFFIN TO N. ERVAY STREET																		
Question Numbers																		
Survey No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1.	3	4	4	3	2	2	2	4	4	4	4	4	3	3	4	4	2	3
2.	4	2	4	4	2	2	4	4	4	4	4	4	4	4	4	4	4	2
3.	3	4	4	2	2	4	2	4	4	4	3	4	2	5	2	4	4	3
4.	1	1	2	2	1	3	1	4	4	4	4	5	2	5	3	3	4	5
5.	2	2	2	3	2	2	2	4	4	4	3	4	4	4	3	4	4	4
6.	3	1	1	2	4	3	4	2	4	2	3	4	2	3	2	1	3	3
7.	1	1	1	3	1	1	1	4	4	5	3	3	2	5	3	3	4	2
8.	3	4	4	2	2	4	2	4	4	4	3	4	2	5	2	4	4	3
9.	4	3	4	4	3	4	2	3	4	4	4	4	4	4	4	4	4	4
10.	4	3	4	5	3	3	5	4	4	4	4	4	3	4	5	4	4	5
11.	4	1	3	4	2	2	5	5	4	5	5	5	4	4	4	3	4	4
12.	4	2	2	3	2	2	4	3	4	4	3	4	3	3	3	4	4	4
13.	3	2	2	1	1	2	4	3	3	4	2	2	1	4	4	4	3	4
14.	1	1	2	2	1	3	1	4	4	4	4	5	2	5	3	3	4	5
15.	1	1	1	3	1	1	1	4	4	5	3	3	2	5	3	3	4	2
16.	2	2	2	3	2	2	2	4	4	4	3	4	4	4	3	4	4	4
17.	4	3	4	4	3	4	2	3	4	4	4	4	4	4	4	4	4	4
18.	4	3	4	1	4	5	3	4	3	5	4	2	1	3	4	3	3	5
19.	4	3	4	5	3	3	5	4	4	4	4	4	3	4	5	4	4	5
20.	3	4	4	2	2	4	2	4	4	4	3	4	2	5	2	4	4	3

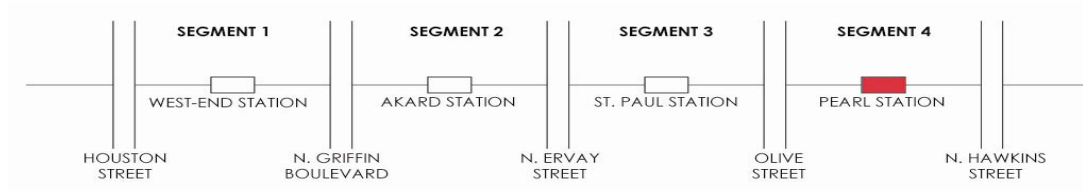
Table C.5 Transitway mall survey data for Section B- St. Paul Segment



Rating Scale: Strongly disagree-1, Disagree-2, Neutral-3, Agree-4 and Strongly agree-5

SURVEY DATA SHEET																		
SEGMENT THREE – N. ERVAY TO OLIVE STREET																		
Question Numbers																		
Survey No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1.	3	4	4	3	2	2	2	4	4	4	4	4	3	3	4	4	2	3
2.	4	4	4	4	3	4	4	4	4	4	4	4	4	4	4	4	4	4
3.	3	3	4	2	2	4	5	4	4	4	3	4	2	5	4	4	4	4
4.	2	5	4	2	4	1	1	4	4	3	3	2	4	3	2	2	4	4
5.	3	4	3	3	2	2	2	4	4	4	4	4	4	3	2	4	4	4
6.	3	1	2	3	2	4	4	4	3	2	4	3	4	2	4	2	3	3
7.	3	3	1	3	1	1	1	3	3	5	5	4	3	4	3	5	5	3
8.	3	3	4	2	2	4	5	4	4	4	3	4	2	5	4	4	4	4
9.	5	4	4	4	4	4	2	4	4	4	4	4	4	4	4	4	4	5
10.	4	3	4	4	2	4	2	4	4	4	3	4	3	4	5	3	3	4
11.	3	1	2	4	2	4	1	3	3	4	2	3	4	3	4	4	4	4
12.	3	3	3	3	3	4	2	3	4	4	3	4	3	3	3	4	4	3
13.	3	4	4	4	3	3	2	4	3	3	4	4	2	4	4	4	4	4
14.	2	5	4	2	4	1	1	4	4	3	3	2	4	3	2	2	4	4
15.	3	3	1	3	1	1	1	3	3	5	5	4	3	4	3	5	5	3
16.	3	4	3	3	2	2	2	4	4	4	4	4	4	3	2	4	4	4
17.	5	4	4	4	4	4	2	4	4	4	4	4	4	4	4	4	4	5
18.	4	4	2	3	4	3	3	4	3	4	4	3	2	3	2	3	4	4
19.	4	3	4	4	2	4	2	4	4	4	3	4	3	4	5	3	3	4
20.	3	3	4	2	2	4	5	4	4	4	3	4	2	5	4	4	4	4

Table C.6 Transitway mall survey data for Section B- Pearl Segment



Rating Scale: Strongly disagree-1, Disagree-2, Neutral-3, Agree-4 and Strongly agree-5

SURVEY DATA SHEET																		
SEGMENT FOUR – OLIVE STREET TO N. HAWKINS STREET																		
Question Numbers																		
Survey No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1.	3	4	4	3	2	2	2	4	4	4	4	4	3	3	4	4	2	3
2.	4	4	4	4	4	3	4	4	4	4	4	4	4	4	4	4	4	4
3.	3	2	3	2	2	4	2	4	4	4	4	4	3	4	1	4	4	4
4.	2	1	2	2	1	1	1	4	4	2	4	3	3	3	2	2	4	5
5.	4	2	3	2	2	2	2	4	2	4	4	4	4	4	4	4	4	4
6.	3	1	2	3	1	3	3	3	4	2	3	3	2	3	2	2	3	3
7.	2	1	1	2	1	2	1	5	3	5	4	4	3	4	2	4	4	5
8.	3	2	3	2	2	4	2	4	4	4	4	4	3	4	1	4	4	4
9.	4	2	3	4	3	5	4	4	4	4	4	4	4	4	4	4	4	4
10.	3	2	3	3	2	3	3	4	3	4	3	3	3	4	4	4	4	4
11.	3	1	2	3	3	4	4	4	2	4	3	4	4	3	3	4	4	3
12.	3	2	3	3	2	3	3	3	4	4	3	3	3	3	3	4	4	3
13.	2	1	2	3	3	4	3	2	2	4	2	3	2	3	2	3	3	2
14.	2	1	2	2	1	1	1	4	4	2	4	3	3	3	2	2	4	5
15.	2	1	1	2	1	2	1	5	3	5	4	4	3	4	2	4	4	5
16.	4	2	3	2	2	2	2	4	2	4	4	4	4	4	4	4	4	4
17.	4	2	3	4	3	5	4	4	4	4	4	4	4	4	4	4	4	4
18.	5	3	4	3	3	5	5	4	3	4	2	4	1	3	5	3	4	4
19.	3	2	3	3	2	3	3	4	3	4	3	3	3	4	4	4	4	4
20.	3	2	3	2	2	4	2	4	4	4	4	4	3	4	1	4	4	4

REFERENCES

- ADA (American with Disabilities Act) US Architectural and Transportation Barriers Compliance Board (Access Board), Accessibility Guidelines for Buildings and Facilities. Washington DC, US Architectural and Transportation Barriers Compliance Board, 2002.
- Bookout, L.W., Beyard, M.D., & Fader, S.W. Value by design: Landscape site planning and amenities. Washington, DC: The Urban Land Institute, 1994.
- Booth, W., Colomb, G. and Williams, J. The Craft of Research. 2nd Edition. The University of Chicago Press, 2003.
- Crankshaw, Ned. Creating vibrant public spaces : streetscape design in commercial and historic districts. Washington: Island Press, 2009.
- Czaja, R., Blair, J. Designing Surveys: A Guide to Decisions and Procedures. 2nd Edition. Pine Forge Press, 2005.
- Dillman, D. A. Mail and Internet Surveys, the Tailored Design Method. New York, NY: John Wiley & Sons Inc., 2000.
- Edminster, R., Koffman, D. Streets for Pedestrians and Transit: An evaluation of three transit malls in the United States. U.S. Department of Transportation, 1979.
- Frank, Lawrence D., Peter O. Engelke, and Thomas L. Schmid. Health and community design: The impact of the built environment on physical activity. Washington, DC: Island Press, 2003.
- Frank LD and Pivo G. Impacts of Mixed Use and Density on Utilization of three Modes of Travel: Single-occupant vehicle, Transit and Walking. Transportation Research Record, 1994.
- Fruin, J.J. Pedestrian Planning and Design. Metropolitan Association of Urban Designers and Environmental Planners, Inc., 1971.
- Eckbo, G. Urban Landscape Design. New York: McGraw-Hill, Inc, 1964.

Hester, Randolph T., and Randolph T. Hester. Planning neighborhood space with people. New York: Van Nostrand Reinhold Co., 1984.

Hopper, Leonard J. Landscape Architectural Graphic Standards. John Wiley and Sons, Inc., 2007.

Huang, S.L. A Study of People's Perception of Waterscapes In Built Environments. PhD. diss., Texas A&M University, 2006.

Iarossi, G. The Power of Survey Design: A User's Guide for Managing Surveys, Interpreting Results and Influencing Respondents. Washington, DC: The World Bank, 2006.

Jacobs, Allen. Great streets. New York: Random House, 1995.

Kaplan, Rachel and Kaplan, Stephen and Ryan, Robert L., With People in Mind: Design and Management of Everyday Nature. Island Press 1998.

Kent, R. Data Construction and Data Analysis for Survey Research. New York, NY: Pelgrave Publishers Inc., 2001.

Kunstler, James Howard. The Geography of Nowhere: The Rise and Decline of America's Man –Made Landscapes. New York, NY: Touchstone, 1993.

Lively, Lori M. Pedestrian Corridors in Downtown Dallas, Texas and their Implications on the Movement of Pedestrians. MLA. diss., The University of Texas at Arlington, 2007.

Lynch, Kevin. The Image of the City. Cambridge: The Massachusetts Institute of Technology, 1960.

Lynch, K, Southworth, M. and Banerjee, Tridib. City Sense and City Design: Writings and Projects of Kevin Lynch. The MIT Press, 1996.

Litman, Todd. Economic Value of Walkability. Victoria Transport Policy Institute, 2007.

Madden, K. How to turn a Place Around? Project for Public Places, Inc., 2000.

Marcus, Clare C. and Francis, Carolyn. People Places: Design Guidelines for Urban Open Space. 2nd Edition. Published by John Wiley and Sons, Inc.1998.

Moudon, Anne V. Public streets for public use. New York: Van Nostrand Reinhold, 1987.

- McHarg, Ian L., Design With Nature John Wiley & Sons, Inc., 1992.
- Nasar, L. J. The evaluative image of the city. Thousand Oaks, CA: Sage Publications Inc., 1998.
- Nelson, Nicholas G. The Relationship between Designed Urban Environments and Skateboarding in Downtown Fort Worth. MLA. diss., The University of Texas at Arlington, 2007.
- Newman, P. and Kenworthy J. Sustainability and Cities: Overcoming Automobile Dependence. Island Press, 1999.
- Newton, Norman T., Design of the Land: The History of Landscape Architecture. Cambridge, MA: Belknap Press of Harvard University Press. 1971.
- North Central Texas Council of Government (NCTCOG). Citizens Guide to Transportation Planning and Programming in the Dallas-Fort Worth Metropolitan Area. March, 2002.
- Ozdil, T.R. Design with Nature and Open Space: Urban Pedestrian Malls, Urban Design Perspective. MLA. diss., University of Colorado at Denver, 1996.
- Ozdil, T.R. Economic Value of Urban Design. VDM Verlag Dr. Muller, Munich 2008.
- Parten, M. Surveys, Polls and Samples: Practical Procedures. Cooper Square Publishers, Inc., 1966.
- Peterson, Robert A. Constructing Effective Questionnaires: Sage Publications 2000.
- Preiser, Wolfgang F. E., Building Evaluation: Advances in Methods and Applications. New York: Plenum Press, 1989.
- Rice, M. Downtown Dallas: Romantic Past, Modern Renaissance. Brown Books Publishing Group, 2007.
- Rubenstein, H. M. Central city malls. New York: John Wiley & Sons, Inc., 1978.
- Rubenstein, H. M. Pedestrian malls, streetscapes, and urban spaces. New York: John Wiley & Sons, Inc., 1992.
- Schmitz, A. and Scully, J. Creating Walkable Places: Compact Mixed-use Solutions. Urban Land Institute, 2006.

Simo, M. Sasaki Associates: Integrated Environments. Antique Collectors Club Ltd., 1997.

Spradley, J. Participant Observation. Holt, Rinehart and Winston, Inc., 2003.

Thiel, Phillip. People, paths, and purposes: Notations for a participatory envirotecture. Seattle, W.A.: University of Washington Press, 1997.

Turabian, Kate L. A Manual for Writers of Term Papers, Theses, and Dissertations. 6th Edition. The University of Chicago Press, 1996.

Taylor, Stephen and Robert Bogdan. Introduction to Qualitative Research Methods: Guidebook and Resource, 3rd Ed, New York: John Wiley and Sons, Inc. 1998.

Tannen, D. The Argument Culture: Moving from Debate to Dialogue 1st Ed, Random House: New York, 1998.

Taylor, Pat D., BS, MS, PhD, and Harwood J. Randle, BLA, MLA, Thesis Guidelines for the Program in Landscape Architecture at The University of Texas at Arlington: Data are Plural. The University of Texas at Arlington, 2006.

Unterman, R. K. Accommodating the pedestrian: Adapting towns and neighborhoods for walking and bicycling. New York: Van Nostrand Reinhold Company, 1984.

William, J. The Principles of Psychology. Henry Holt and Company, New York, 1918.

Whyte, William H. The Social Life of Small Urban Spaces. New York: Project for Public Spaces, 1980.

Publications/Periodicals:

Dillon, David. "Dallas's DART: A Ramblas for the Southwest?" Landscape Architecture Magazine. June, 1993.

Martin, Frank E. Light Rail comes to Dallas. Landscape Architecture Magazine. March, 1999.

Myerson, Allen R. Dallas Opening Southwest's First Rail Transit. New York Times. June 14, 1996. <http://www.nytimes.com/1996/06/14/us/dallas-opening-southwest-s-first-railtransit.html>

Websites:

Burden, D. www.walkable.org (Accessed June 20, 2009).

Dallas Area Rapid Transit

<http://www.dart.org> (Accessed January 27, 2009).

Sasaki Associates:

<http://www.sasaki.com/what/portfolio.cgi?fid=149&service=2&page=1> (Accessed February 27, 2009).

Take a Train Lesson from Dallas, Of All Places

<http://www.engr.uconn.edu/~garrick/transportation/oped-dec-2000.htm> (Accessed April 7, 2009).

United States. North Central Texas Council of Government. 2000 Land Use by City.

<http://www.nctcog.org/ris/demographics/landuse/landuse2000.pdf> (Accessed January 27, 2009).

United States. North Central Texas Council of Government. Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area

<http://nctcog.org/trans/mtp/2030/> (Accessed January 27, 2009).

BIOGRAPHICAL INFORMATION

Vaidehi Niteen Gupte was born in Mumbai, Maharashtra, India. She completed her bachelor degree in Architecture from Rachana Sansad's Academy of Architecture, Mumbai, India. Ms. Gupte has two years experience working as an architect with Talati and Panthaky Associates in India. Currently, she is a landscape architecture intern in the Planning unit at the Parks & Recreation Department of the City of Arlington. She is interested in walkability of urban spaces along with transit-oriented developments and looks forward to working in these areas after graduation.