2017 LAF CSI PROGRAM LANDSCAPE PERFORMANCE SERIES: The Shops at Park Lane

Research Title: Landscape Performance Series – The University of Texas at Arlington Case Study Investigations 2017; Harvest Community, Argyle; Shops at Park Lane, Dallas and Wayne Ferguson Plaza, Lewisville[1]

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Many Thanks to TBG Partners, Northwood Retail and the Park Lane community

(Source: TBG Partners, 2017)

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Overview of UT Arlington's Research Strategy for Case Studies

Introduction:

The purpose of this research is to investigate the landscape performance of three different North Texas landscape architectural project: 1) Harvest Master Planned Community, Argyle, 2) Shops at Park Lane, Dallas 3) Wayne Ferguson Plaza, Lewisville Texas. This research is initiated as part of 2017 Case Study Investigation (CSI) program funded by the Landscape Architecture Foundation (LAF). It is conducted in collaboration with the project landscape architecture firm: 1) & 2) TBG Partners 3) Design Workshop.

The case study research tasks and reporting are outlined in advance by LAF to present project profile and overview, sustainable features, challenges/solutions, lessons learned, role of landscape architects, cost comparisons, and performance benefits. Within the LAF framework, the UT Arlington research team, with its professional firm partners, collected, reviewed, and analyzed/synthesized project-related data for over 21 weeks between February – August 2017 to prepare the case studies published online at the LAF website.

The UT Arlington team developed its overall research design strategy in the 2013 & 2014 cycles as one of the recipients of the LAF's CSI grant/recognition (see Ozdil et. al., 2014). As a third term grant recipient in 2017, the UT Arlington team continues to follow the strategy developed in the previous years with some revisions based on the lessons learned in the 2013 and 2014 period. The research outlines its inquiry under the three sub-category headings – environmental, economic, and social (including cultural and aesthetic) – to establish a comprehensive and systematic framework, ease the data collection and analysis process for multiple case studies, and to avoid losing sight of research goals while documenting a diverse set of findings. These subcategories are used primarily to identify and organize the performance benefits of landscape architecture projects in this collaborative effort.

The UT Arlington research combines quantitative and qualitative methods to document both landscape architectural projects and to assess their performance benefits (Deming et. al., 2011; Murphy, 2005; Moughtin, 1999; Ozdil et. al., 2015, & 2014; Ozdil, 2016 & 2008). Methodological underpinnings of the research for the case studies are primarily derived from a systematic review of performance criteria and variables from: (1) the LAF's landscape performance series *Case Study Briefs* (LAF, 2017), (2) the case study methods that are developed for designers and planners in related literature (Francis, 1999; Gehl & Svarre, 2013; Gehl, 1988; Marcus et. al. 1998; Ozdil et. al., 2013; Preiser et. al., 1988), (3) the primary data collection methods through surveys (Dilman, 1978), site observations, behavior mapping, and assessment techniques (Gehl & Svarre, 2013; Marcus et. al. 1998; Whyte, 1980 & 1990), and finally (4) project-related secondary data collected from project firms, project stakeholders, public resources and databases. The data gathered from all the research instruments are further analyzed, synthesized and summarized as the performance benefits for the three case studies under investigation. The findings are organized within the LAF framework, as it is outlined earlier in this document for online publication. The research is designed to highlight the value and significance of these three landscape architecture projects by utilizing objective measures and by documenting and evaluating their performance to inform the design of future urban landscapes.

Data Collection Methods:

The research plan involves collection of primary and secondary data through online surveys, systematic review of available secondary data and some site observations to document environmental, social and economic performance benefits. As a first step, the research team acquired necessary permissions from the Institutional Review Board at UT Arlington prior to primary data collection involving human subjects. The following section briefly reviews some of the major data collection strategies adopted in this research.

Survey: The survey instruments were developed by the research team to collect primarily social performance data for all three sites. The survey measures user perception on topics such as: quality of life; sense of identity; health, community, and educational benefits; safety and security; presence of arts; availability of informal and organized events as well as some other key variables listed below. The survey is informed by relevant literature, by other survey instruments prepared for parks and other landscape architecture projects, and by research teams' previous work in the 2013 and 2014 grant cycles. The survey instrument and the variables within are kept similar in all three cases in order to develop a more homogenous measure with which to study varying sites. The survey simply asks the users (residents, visitors, employees, etc.) of the sites for their perceptions and experiences of the case study landscapes. The survey will be composed of three parts. The first part of the questionnaire documents user profiles as well as user perceptions and choices of activities available on the site by using multiple choice questions. The second part of the survey asks users to rate performance-related statements with Likert scale questions. The final portion of the survey asks for additional comments of respondents who want to share additional information with the research team. The survey is voluntary and the respondents were assured that identities would be kept confidential to ease privacy concerns. The survey was kept short (15 minutes to complete) and was prepared for web/online platforms.

Archival and Secondary Data: This research benefits heavily from archival and secondary data obtained from project firms, stakeholders, public resources, and private databases to measure social, economic, and environmental performance benefits. In accordance with LAF's mission, this research was a product of a partnership among the academic research team, project firm, and LAF. Where and when data were available from the secondary sources, such as the landscape architecture firm, client(s), project partners, scholarly literature, and publicly available sources, the project team systematically collected and organized the data, reviewed its content, and assessed its rigor and integrity.

Site Observations: Passive observation, photography, video recording, and site inventory and analysis techniques were also utilized in 2017 case studies to capture social performance benefits. Observational methods utilized in this research did not involve any intrusive interaction with the subjects. Where photography or video recording is used, the identity of the subjects is blurred unless they allow researchers to use their images or the research partners provided photos with credentials. In all case studies, the research team informed the stakeholders prior to site visits and acquired necessary permissions.

Research Design:

The UT Arlington team designed its research strategy under three focused thematic areas – environmental, economic, and social (including cultural and aesthetic) – for all three case studies. The strategy for all three cases this year uses variables and measures informed by relevant scientific literature, UTA's previous strategy proven to be effective in 2013 & 2014 grant cycles, and most importantly the new project typologies (Master Planned Community, Traditional Town Plaza, and Contemporary TOD Plaza with Shops) assigned in the 2017 cycle. In the beginning of the investigation, the research team benefited from this strategy for conducting a systematic research that produces replicable performance criteria and methods for all sites. After the measurable criteria were identified and the possibilities exhausted, the UT Arlington team further refined its approach by customizing performance criteria and procedures to each case study site to better document and report the varied qualities of each site independently. While achieving a comparable set of performance benefits for all sites was the goal, and this strategy produces the greater framework for the research, customizing detailed performance criteria later in the process helped the research team to overcome concerns about data availability, varying project typologies, project goals and outcomes. Given the strong variation in

project typologies in 2017, a separate research instrument (survey) is being created for each site.

The findings of the investigations in all cases focused first on performance benefits related to the site itself, then its immediate adjacencies, and finally on the project block group/neighborhood/district or zip code. For example, performance benefits that are most direct and telling about the project site itself are emphasized more in comparison to indirect performance benefits and findings about the project adjacencies or neighborhoods. This strategy is also used in the reporting of the findings to clarify the document and to ease the review.

In conclusion, the data collected through these strategies were systematically reviewed and appropriate methods for analysis of specific performance criteria are highlighted in the detailed methodology below. The following section presents research design specifics for The Shops at Park Lane, a basic summary of the performance criteria under investigation, and the data sources and procedures involved in measuring that particular performance criteria.

Overview of Shops at Park Lane Project & UT Arlington's Research Strategy:

Figure.1 The Shops at Park Lane, Before and After (Source: Northwood Retail, 2017)

Overview:

The Shops at Park Lane is the centerpiece of the Park Lane development, a Transit Oriented Development (TOD) on 33 acres at a prime intersection of multimodal urban activity. The Shops at Park Lane replaced four acres of surface parking with live, work and play options while activating the larger urban setting and supporting regional and economic growth. Located less than five miles north of Dallas and adjacent to a traditional shopping mall, this TOD creates a lively destination, provides life and soul to retail, office and multifamily housing space, and helps galvanize the existing development with an outdoor plaza, amenities, and pedestrian-friendly shopping, dining and entertainment. Traffic circulation and flow are improved with new streets and curbless pedestrian paths to enhance walkability. A new park serves as the central multipurpose green and includes a promenade of spray jets, outdoor dining terraces and a series of water walls, effectively encouraging visitors to gather and linger.

Case Study Strategy: The research team followed the comprehensive investigation strategies outlined earlier in this document by concentrating on the social, environmental, and economic implications of the project. The team's approach to identify performance benefits for The Shops at Park Lane is mainly driven by detecting the site and the district level challenges (see above), by reviewing its spatial organization to create people places, and by evaluating elements influencing its forms and functions to provide visitors with access to outdoor amenities that open opportunities to experience the plaza, the lawn, water play, outdoor dining as well as social events. Its status as a destination and its social and

recreational qualities as an urban plaza in a mixed-use district for urban dwellers and visitors encouraged the research team to investigate user perceptions. After reviewing the relevant literature, the project information, and the firm archives with TBG Partners, the UT Arlington research team developed detailed procedures and performance measures that can be tied to the project's initial challenges, goals and objectives (see figure.2 for research design).

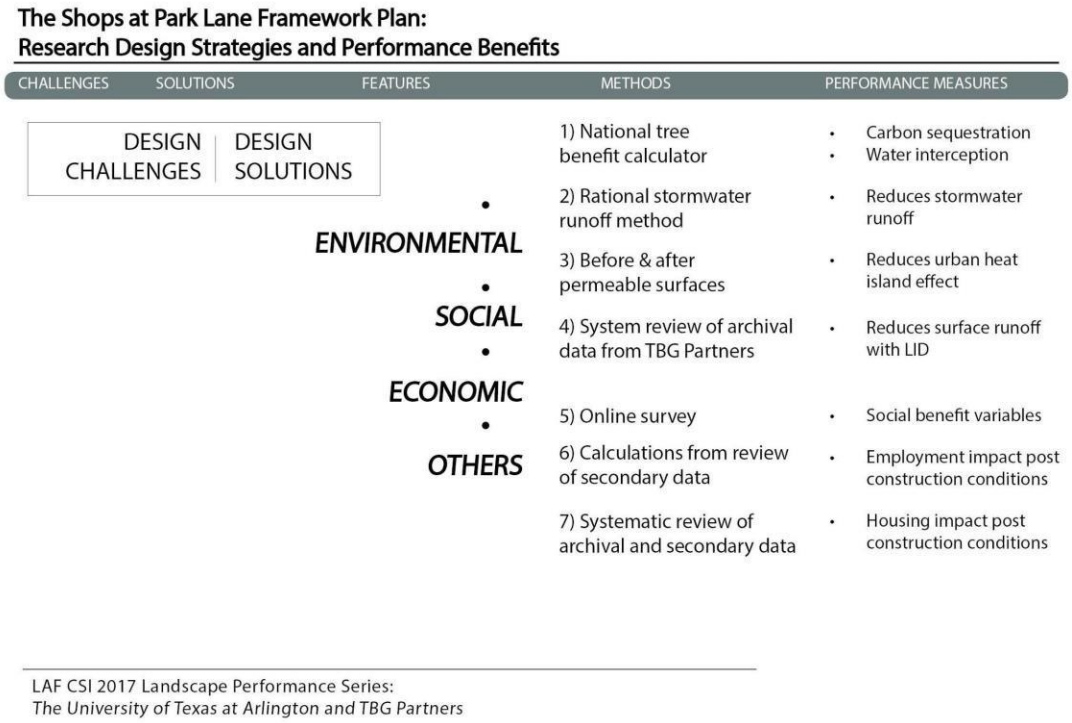

Figure.2 Research Design

The research team followed the research design strategies outlined in the earlier portion of this document for the Park Lane Plaza case study (see figure.2 above). The team explored social, economic and environmental performance measures. Given the district-level focus on live, work, and play, the research team emphasized performance criteria that are more telling about the perceptions of the users, programmatic elements of the various park components, innovative practices, and cultural implications for visitors, as well as its economic impact to its immediate context. The Shops at Park Lane's diverse regional user base encouraged the research team to emphasize online surveys, in addition to some site observations done by the research team as data collection strategies. After acquiring Institutional Review Board (IRB) permissions for human subjects from UT Arlington, the survey was distributed via e-mails, social media outlets, and/or professional network.

The research procedure also involved documenting the environmental and economic performance indicators for this case study. Various secondary data sources were reviewed to determine the project's economic and environmental influence, and numerous positive indicators are found representing the larger context of the project site. However, especially in the case of economics, the causality between the improvements and the economic changes in most instances were not direct and not specific enough to the project, and not as informative as the researchers desired. Therefore, only a few selected economic performance measures are highlighted for the Shops at Park Lane case study. The next section outlines the specific performance benefits documented for this 2.8-acre park by illustrating data sources and procedures followed, as well as the limitations encountered measuring the particular performance criteria.

Performance Indicators:

The following bullet points explain and illustrate some of the more complex performance indicators summarized on the LAF CSI website. The performance indicators listed below are in their full form, and explained in detail to inform the reader about the calculations, procedures, limitations and/or significance of the research. These bullets are later formatted, summarized and/or further revised to comply with the online portal restrictions.

Environmental Performance Benefits:

Performance Indicator.1:

- *Sequesters approximately 2,767 lbs of atmospheric carbon annually in 43 newly planted trees. The tree canopies also intercept 11,453 gallons of stormwater runoff annually.*

Scientific name	DBH (inches)	CO2 sequestered by one tree (lbs)	Quantity of trees	Total CO2 sequestered (lbs)
Quercus virginiana	2	24	3	72
Quercus virginiana	3	43	6	258
Quercus virginiana	16	500	1	500
Fraxinus Pensylvanica	4	59	28	1,652
Ulmus Parvifolia	3	57	5	285
Total			43	**2,767**

Table.1: Tree's potential for carbon sequestration.

Methods: As illustrated in the table above, the carbon sequestered is calculated with the National Tree Benefit Calculator (http://www.treebenefits.com/calculator/).

For example: A single *Quercus virginiana* of 3" DBH sequesters 43 lbs of CO2. There are total of six *Quercus virginiana* in the planting plan of The Shops at Park Lane. Thus, the total amount of CO2 sequestered by *Quercus virginiana* would be:
43 lbs*6 = 258 lbs

One metric ton comprises of 2,204 lbs. Thus, the total CO2 sequestered with the help of all the trees would be:
2,768/2,204 ~ **1.26 metric tons**

Limitations: This indicator relies on tools and estimations that are developed/provided by third parties and may be subject to errors beyond the research team's control. The caliper information is retrieved from the planting design document.

Scientific name	DBH (inches)	Stormwater intercepted by one tree (gallons)	Quantity of trees	Total stormwater runoff intercepted (gallons)

Quercus virginiana	2	80	3	240
Quercus virginiana	3	138	6	828
Quercus virginiana	16	3,117	1	3,117
Fraxinus Pennsylvanica	4	211	28	5,908
Ulmus Parvifolia	3	272	5	1,360
Total			43	**11,453**

Table.3: Trees' potential for water interception.

Methods: As illustrated in the table above, the stormwater intercepted is calculated with the National Tree Benefit Calculator (http://www.treebenefits.com/calculator/).

For an example: A single *Quercus virginiana* of 3" DBH intercepts 138 gallons of stormwater runoff. There are a total of 6 *Quercus virginiana* in the planting plan of The Shops at Park Lane. Thus, the total amount of stormwater intercepted by 6 *Quercus virginiana* would be:

138 gallons*6 = 828 gallons

Performance Indicator.2:

- *Reduces the peak stormwater surface flow rate for a 2-inch rain event by 2% from 5.928 cfs to 5.831 cfs by reducing impervious surfaces by 2% or 0.065 acres.*

Stormwater Runoff - pre-development					
Description	Area (sq. ft)	i (inches/hour)	Area (Acres)	C (co-efficient number)	Q=CiA (cu. ft/sec)
Concrete paving	109,136	2	3.29	0.9	5.922
Planting and Lawn	8,712	2	0.01	0.3	0.006
Total (raw numbers)	**145,936**	**2**	**3.3**		**5.928**
Total (based on weighted-averaged coefficient number for total area)	**145,936**	**2**	**3.3**	**0.863**	**5.928**

Stormwater Runoff - post-development					
Description	Area (sq. ft)	i (inches/hour)	Area (Acres)	C (co-efficient number)	Q=CiA (cu. ft/sec)
Concrete Paving	94,571	2	2.17	0.9	3.9
Brick Paving	8,538	2	0.196	0.65	0.254
Planting and Lawn	1,567	2	0.035	0.3	0.021
Building - Green Roof	1,340	2	0.03	0.3	0.018
Building - Others	39,920	2	0.91	0.9	1.638

Total (raw numbers)	**145,936**	**2**	**3.3**		**5.831**
Total (based on weighted-averaged coefficient number for total area)	**145,936**	**2**	**3.3**	**0.8972**	**5.831**

Table.4: Stormwater runoff; pre- and post-development comparison

Methods: As illustrated in the tables above, the stormwater runoff is calculated with the Rational Method (Q=CiA). The Coefficient numbers for different materials are referenced from the LARE Reference Manual.
For example: A 8,538 sq. ft brick paving surface will create a 0.254 cu. ft per second runoff in a single rain event of 2". (Please note that the area used in the following calculation is converted into acres. The area of an acre is equivalent to 43,560 sq. ft):
CiA=Q
0.65*2 inches*0.196 acres = 0.254 cu. ft/sec
As seen from the tables above, the total stormwater runoff post-development is 5.831 cu. ft/sec and the total stormwater runoff pre-development is 5.928 cu. ft/sec.

5.928 cu. ft/sec - 5.831cu. ft/sec = 0.097 cu. ft/sec

Thus reducing the stormwater runoff post-development by 0.097 cu. ft/sec.
Considering the pre-development stormwater runoff as 100%, the post development runoff is 98% as a result, **reducing the stormwater runoff by 2%**.

Finally, overall there are 0.097 cu. ft/sec reductions in the stormwater runoff which is 2% reduction for the whole site.

Limitations: All calculations were derived from aerial photos and images, which slightly hinder the accuracy of the exact square footage. Furthermore, the Rational Method (Q=CiA) is a mathematical formula developed to estimate stormwater runoff amount. It has mathematical limitations in terms of how accurate to round up any and all decimal outcomes.

Performance Indicator.3:

- *Reduces runoff by 37% through an extensive green roof system covering 56% of the 2,394-sf roof.*

Stormwater Runoff - on concrete roof					
Description	Area (sq. ft)	i (inches/hour)	Area (Acres)	C (co-efficient number)	Q=CiA (cu. ft/sec)
Entire roof with concrete	2,394	2	0.055	0.9	0.099

Stormwater Runoff - on green roof

Description	Area (sq. ft)	i (inches/hour)	Area (Acres)	C (co-efficient number)	Q=CiA (cu. ft/sec)
Concrete Portion	1,054	2	0.025	0.9	0.045
Green portion	1,340	2	0.03	0.3	0.018
Total					0.063

Method: Rational runoff method

Performance Indicator.4:

- *Reduces overall water consumption by 64% on a per-sf basis as compared to other areas of the Shops at Park Lane development by utilizing a low water consumptive plant palette.*

Method: Data provided by Northwood Retail, the project client, as well as the development management company.

Performance Indicator.5:

- *Provides 24% shade over the summer months through tree canopy cover and shade structures, compared to 6% pre-development.*

Method: Simulation and secondary data calculations – 0.8 acre of 3.3 acres is covered with trees or shade structures.

Limitations: All calculations were derived from aerial photos and images, which slightly hinder the accuracy of the exact square footage.

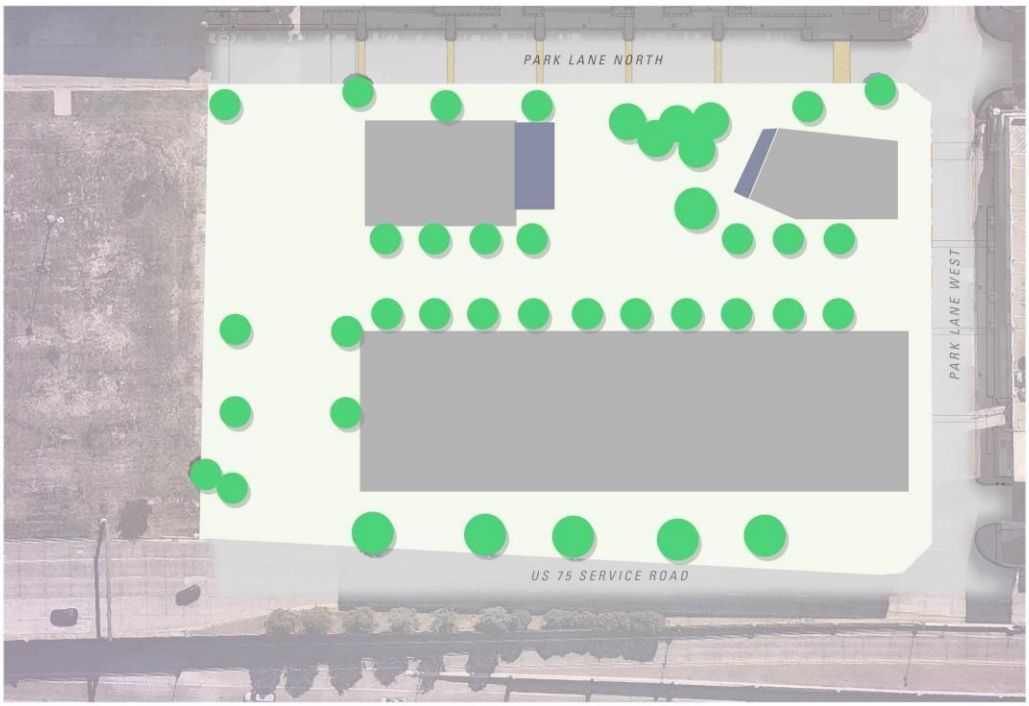

Figure: Shade conditions were calculated for a typical summer day

Social Performance Benefits:

Performance Indicator.1:

*According to the Shops at Park Lane Survey conducted by the UT Arlington research team, respondents **agree or strongly agree with the statement** that Shops at Park Lane (N: **60**):*
• *Promotes a perception of a **safe & secure environment** for **90%** of the survey respondents primarily through **Lighting, Visibility, Presence of Other and Security Personnel**.*
• *Improves **perception of the Park Lane Development/District** for **86.7%** of the survey respondents.*
• *Is perceived **favorably by 85.8%** of the respondents.*
• *Improves the **quality of life** for **83.3%** of the survey respondents primarily through **A Place to Be Outdoors, Reduce Mental Stress, and Place to Meet People.***
• *Provides **access for all (American Disability Act-ADA)** for **81.7%** of the survey respondents.*
• *Has **a sense of identity** for **81.7%** of the survey respondents.*
• *Improves **perception of the City of Dallas** for **73.3%** of the survey respondents.*

• *Promotes **healthy living** for **71.6%** of the survey respondents primarily through **Passive Activities, Relaxing, and Fountain Play**.*
• *Promotes **scheduled/organized events** for **68.3%** of the survey respondents through **Outdoor Movies, Music Concerts, and Festivals**.*
• *Provides opportunity **to capture moments and create memories** **66.7%** of the respondents.*
• *Encourages **multigenerational interaction** for **63.4%** of the survey respondents.*
• *Improves understanding of **landscape architectural practice** for **61.7%** of the survey respondents.*
• *Promotes **art and artistic activities** for **40%** of the survey respondents primarily through Fountains and Water Features, Garden Design, and Sculpture.*
• *Promotes a **better understanding of sustainability** for **40%** of the survey respondents through **Walkability, Native Planting, and Urban Greenery**.*
• *Increases **participation in outdoors** for **41.6%** (25% neutral) of the survey respondents primarily through **Food Consumption, Shopping, and Place to Take a Walk**.*
• *Encourages people **to live within walking distance** for **33.3%** (30% disagree) of the survey respondents.*
• *Promotes **educational activities** for **21.7%** (50% neutral) of the survey respondents.*
***Survey notes:** **60** The Shops at Park Lane users were surveyed between June and July 2017 by UT Arlington research team. **45%** of the plaza users surveyed noted themselves as **'visitor'** while **46.7%** as **'employee'** and only **3.3%** as **'resident.'** Survey findings also illustrated that only **1.7%** of the users were visiting the park **first time** and **28.3%** **daily** while **90%** visit the park **at least one time per month**. Additionally, **95%** of the respondents arrive to the Plaza by using a **personal vehicle.** Median respondents travel **5** miles (9.8 miles average respondent) to get to The Shops at Park Lane.*
***Method:** Online Survey. Please see the data collection methods in the beginning of the paper.*
***Limitations:** This survey was conducted only on an online platform due to resource, time, and permissions limitations. Online survey recruitment letter was circulated among various e-mail lists and social media groups throughout North Texas. It was realized that online surveys may produce more targeted results depending on where the survey can be circulated in a short amount of time. However, it may not always assure high response rates. Another potential limitation is that the recruitment strategies used in this instance do not assure randomized sampling, which may have influenced the*
**Not all of the survey results/findings are reported in their entirety due to LAF's online formatting restrictions for their website, therefore the list only includes a sample of the survey findings. For further information, contact the UTA research team for this case study: Dr. Taner R. Ozdil, ASLA, tozdil@uta.edu.*

Performance Indicator.2:

- *Contributed to a 9% population increase within 0.25 mile of the development from 2010 to 2016.*

Methods: Data sourced from *Esri Business Analysis* Software and U.S. Census.

Limitations:
Total number of housing units is calculated from Owner, occupied as well as renter occupied units, from U.S. Census data as it is appeared in *Esri Business Analysis* demographic and Income comparison profile.

Given that the data was collected from secondary sources, there may be inherent errors and/or omissions to such data beyond the researchers' control. Also, the reader must be aware that understanding the demographic and economic impact of a project like Park Lane in an urban environment is a complex task. Although this bullet takes into account promising demographic activity surrounding the park, it is not taking into consideration some of the larger trends within the greater district.

Economic Performance Benefits:

Performance Indicator. 1:

- *Stimulated increase in occupancy rates for retail and multifamily up to 95% and for office up to 100% in its newly added 550,000 sf of retail and mixed-use development as well as other adjacent buildings since its inception. According to project client, the office tenants attribute this change to park, on site amenities, and restaurants.*

Method: Major portion of the secondary data was provided by Northwood Retail, which is the project client as well as development management company. Due to client customer confidentiality only summary data and information were provided by the client. Additional public and/or local real estate company data was also reviewed.

Limitations: Given that the data was collected from secondary sources, there may be inherent errors and/or omissions to such data beyond the researcher's control. Also, the reader must be aware that understanding the demographic and economic impact of a project like Park Lane in an urban environment is a complex task. Although this bullet takes into account promising economic activity surrounding the park, it is not taking into consideration some of the larger trends within the greater district.

Performance Indicator. 2:

- *Contributed to the position of most of the national retailers in The Shops at Park Lane in the top 10% of their respective chains in sales by increasing customer dwell time and providing additional park-side restaurants.*

Method: Major portion of the secondary data was provided by Northwood Retail, which is the project client as well as the development management company. Due to client customer confidentiality, only summary data and information were provided by the client. Additional public and/or local real estate company data was also reviewed.

Limitations: Given that the data was collected from secondary sources, there may be inherent errors

and/or omissions to such data beyond the researcher's control. Also, the reader must be aware that understanding the demographic and economic impact of a project like Park Lane in an urban environment is a complex task. Although this bullet takes into account promising economic activity surrounding the park, it is not taking into consideration some of the larger trends within the greater district.

Performance Indicator. 3:

- *Contributed to a 1% increase in the total market value (or property value) of Park Lane District between 2010 and 2016.*

Method: Data is collected from Dallas County Appraisal District (maps.dcad.org) for each of the 80-plus properties in the greater Park Lane development.

Limitations: Given that the data was collected from secondary and public sources, there may be inherent errors and/or omissions to such data beyond the researcher's control. Also, the reader must be aware that understanding the demographic and economic impact of a project like Park Lane in an urban environment is a complex task. Although this bullet takes into account promising economic activity surrounding the park, it is not taking into consideration some of the larger trends within the greater district.

Performance Indicator. 4:

- *Help stimulate median household income by **1.85%** between 2013 and 2016 within a 0.25-mile radius surrounding The Shops at Park Lane.*

Method: Data is collected from U.S. census and the State of Texas.

Limitations: Given that the data was collected from secondary sources, there may be inherent errors and/or omissions to such data beyond the researcher's control. Also, the reader must be aware that understanding the demographic and economic impact of a project like Park Lane in an urban environment is a complex task. Although this bullet takes into account promising socio-economic activity surrounding the park, it is not taking into consideration some of the larger trends within the greater district.

Performance Indicator. 5:

- *Shows a break even in return of investment through distinct design and art programming (performance and studio art) within five years after construction.*

Method: Secondary data was provided by TBG Partners as part of case study application.

Limitations: Given that the data was collected from secondary sources, there may be inherent errors and/or omissions to such data beyond the researcher's control. Also, the reader must be aware that understanding the demographic and economic impact of a project like Park Lane in an urban

environment is a complex task. Although this bullet takes into account promising socio-economic activity surrounding the park, it is not taking into consideration some of the larger trends within the greater district.

Cost Comparison Calculations:

The detailed cost for the roof shows that while a traditional roof (roof structure, waterproofing, and drainmat) would have cost approximately $20/sf, the cafe's extensive green roof (which includes everything above the drain mat: 4" modular tray system, planting medium, planting material, and irrigation) cost approximately $35/sf in addition to its traditional roofing (approximately $20/ sf). It is also estimated by the contractor that if a typical intensive green roof was designed and built as part of this project, it would have cost anywhere from $60/sf - $140/sf (average cost being about $100/sf) plus traditional roofing cost depending on the level of finish out. The overall cost comparison of the Starbucks building itself illustrates that while a typical traditional retail core and shell finish out for such buildings in the region costs approximately $125/sf. - $150/sf., the final built out for 2,500-sf. Starbucks building was approximately $450/sf. Given that, the mixed-use buildings adjacent to the plaza are nearly 100% occupied and the Starbucks at Shops at Park Lane is one of the highest revenue generating stores in the region. According to the project client, such building improvements and landscape amenities in high-density projects are amenable to generating the quality desired in the landscape.

Sustainable Feature:

- *Provides habitat for 4 primarily Texas native plant species out of 23 planted. This makes up 17% of the overall plant species (trees, shrubs, perennials and groundcovers).*

  Method: University of Texas at Arlington's research team observation from TBG design documents. The plant data from the firm is evaluated with the Texas Native plant database from BONAP and the Lady Bird Johnson Wildflower Center Texas-North Central recommended species.

  Limitations: Relies on data pertaining to the whole state of Texas and not specific to microclimate of Dallas.

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