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**Papers in Applied Geography**

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# PAPERS IN APPLIED GEOGRAPHY

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# CAN YOU REALLY WALK THERE FROM HERE? A CASE STUDY OF WALKABILITY AT MOCKINGBIRD STATION IN DALLAS, TEXAS

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## 1. INTRODUCTION

New Urbanism, transit-oriented development (TOD), and walkability have all become closely linked in the contemporary urban development literature. Urban plans across the United States increasingly emphasize a wide range of transportation options, instead of relying on the automobile alone. The growing prominence of websites like WalkScore (<http://www.walkscore.com>) exemplifies the growing importance of walkable communities for many modern Americans.

Unfortunately, existing accessibility indices - such as WalkScore - have some important shortcomings in identifying the true walkability of a neighborhood. Speck (2013) suggests that walkability has many components, some of which are difficult to quantify. Various accessibility indices focus on different aspects of the pedestrian sphere, but a comprehensive index has yet to emerge. Each index differs in approach: many focus on various distance measurements between two or more destinations or types of destinations, while others attempt to address the differences between pedestrian-oriented transportation infrastructure (*i.e.*, crosswalks, sidewalks, crosswalk timers, *etc.*)

In studying pedestrian accessibility, Talen (2003) notes that investigations of pedestrian accessibility are ideally situated around the concept of "neighborhood" – where needs and mobility can be properly assessed. Broadly, this concept emerged from the works of Jacobs (1961) and Duany and Plater-Zyberk (1991). In rejecting the automobile-oriented nature of post-World War 2 urban and suburban development, these theorists advocated re-focusing cities and towns on the people, asserting that the basic needs of a family should be easily accessible to anyone from all walks of life. However, in measuring this aspect of New Urban development, pedestrian accessibility indices have fallen behind.

This paper argues that in order to determine the accessibility of a neighborhood for pedestrians, a range of factors must be explored – several of which have been under-utilized in existing accessibility indices. In order to investigate this, the Mockingbird Station TOD in Dallas, Texas is used to assess two questions: are basic needs provided by businesses in the neighborhood, and are these businesses accessible to pedestrians? Ideally, businesses would serve the needs to those living in the community; however previous work suggests that this may not be the case in many New Urban developments (Wilson-Chavez and Rice, 2012). This paper argues that different arrangements of businesses and pedestrian infrastructure can impact the walkability of a neighborhood, suggesting that pedestrian accessibility indices should include business composition and pedestrian infrastructure where possible.

## 2. MOCKINGBIRD STATION

Since opening in 2000, Mockingbird Station in north Dallas has become known as a good example of successful transit-oriented development. This mixed-use development adjacent to Dallas Area Rapid Transit's (DART) light rail station (also called Mockingbird Station) was developed in an agreement between DART and UCR Urban / Hughes Development. The original plans called for a mixed-used development with residential units,

ground floor retail, office space, and a large hotel. Plans for the hotel never emerged, but other aspects did. Today, Mockingbird Station has over 200 residential units, more than 200,000 square feet of retail and entertainment space, and more than 130,000 square feet of office space (DART, 2010). Retail and service sector businesses are mostly upscale, with retailers such as American Apparel, Urban Outfitters, and West Elm all occupying space within the development. Over 1,500 parking spaces are provided in the development, with two parking garages and store-front parking available to residents and visitors. Additionally, the light rail station offers connections to the DART Red and Blue lines and to several bus routes. The site is also strategically located for automotive access, being at the intersection of two major thoroughfares: U.S. Highway 75 (Dallas' Central Expressway) and Mockingbird Lane (Figure 1).



FIGURE 1  
MOCKINGBIRD STATION MAIN ENTRANCE

Prior to the development of Mockingbird Station, much of the area was zoned for office and industrial uses. A Dr. Pepper bottling plant, a Western Union telephone plant, and a Dallas Cowboys practice field occupied land in the vicinity of Mockingbird Station. Today, the area is zoned for mixed-use development, and several private developers are working within the area to develop a mixed-use, walkable community. Several projects are currently under construction in the TOD area that will add even more mixed-used space and multi-family residential units to the area. With Southern Methodist University (SMU) located on the other side of U.S. Highway 75, much of this future growth is aimed at a college-aged demographic or to recent college-graduates. Overall, Mockingbird Station, and the neighborhood surrounding it, is known as a dense, mixed-use, and walkable area. But how walkable is Mockingbird Station beyond the 'walls' of the development?

### 3. PEDESTRIAN ACCESIBILITY INDICES

Walkability is only one aspect of well thought out urban design. In order to gauge the success of various attempts at creating more walkable communities, a number of researchers have worked to adapt the indices commonly used to explore automobile accessibility. In a broad sense, accessibility is linked to the concepts of mobility (ability to move between points)

and proximity (the distance between points) (Cervero, 2005). Accessibility indices merge these concepts in order to understand how different spatial arrangements influence transportation habits and patterns. In recent years, advances in geospatial information and technology, especially GIS, has enabled more rigorous use of accessibility indices than previously possible (Song and Sohn, 2007). As attention has shifted towards understanding walkability, pedestrian accessibility indices have become increasingly important.

When it comes to addressing pedestrian accessibility, distance is one key feature. A large body of work (O'Neil *et al.*, 1992; Saelens *et al.*, 2003) assesses the distance between various types of land-uses, generally the distance between a residential unit and various types of land-uses (Cervero and Duncan, 2006). When these are used, however, retail has been included as a one-dimensional variable. The distance between a residential unit and a retail outlet may be short, but the type of business could potentially yield little in the way of walkability (consider houses situated behind a big box store oriented towards one-stop shopping). O'Neil *et al.* (1992) suggested that simple Euclidean distance measurements over-represent the population within a 'walkable' distance of a feature. Saelens *et al.* (2003) argued that the local terrain may have some impact on the choices made by those walking to a destination. At some level, a pedestrian accessibility index must address both of these issues. As Gallagher (2012) notes, many researchers look at network connectivity, which may ignore the subtleties of understanding true walkability by ignoring off-network routes or street conditions.

A large body of work exists that investigates the types of infrastructure and amenities that encourage walkability (Kerridge *et al.*, 2001; Dixon, 1996). Work by Craig *et al.* (2002) identifies more than a dozen characteristics that positively influence walkability, in order to understand how to create healthier populations. These characteristics are each coded on a scale of one to ten, and measure aspects such as the number of destinations, the variety of walking routes, and the potential for crime to occur. Notably, business activity is only partially measured and, even then, is done so one-dimensionally. A review by Owen *et al.* (2004) identified 60 different characteristics associated positively or negatively with pedestrian accessibility, stratified into three categories: walking for exercise or leisure, walking for utilitarian reason (between two or more places), and total walking (regardless of purpose). However, businesses were again represented solely as "Stores in walking distance" (Owen *et al.*, 2004, 73).

While measuring pedestrian infrastructure is common, measuring business diversity has been limited. Song and Sohn (2007) investigate accessibility, not pedestrian accessibility, in relation to various types of retail establishments. The importance of businesses to pedestrian accessibility is evident (Handy, 1992). As suggested by Speck (2013) if basic needs are not met within a walkable distance then an automobile-oriented lifestyle is the only option. How does business diversity impact pedestrian accessibility and a neighborhood's walkability?

#### 4. DATA AND METHODS

Two primary data sources were used in this research. First, data from the 2010 US Census were collected for all Census Tracts within 1.5 miles of Mockingbird Station. This distance was chosen primarily to replicate realistic neighborhood limits. For example, when considering pedestrian access at venues such as Mockingbird Station (located at the intersection of a regional expressway and a major regional roadway), too large of a buffer would cover an area beyond the local neighborhood. Census tracts identified with this method are identified in Figure 2. The Census data was used to identify demographic characteristics of the community: age, race/ethnicity, total population, and population density. This information is useful in understanding the make-up of the population living near Mockingbird Station.

To explore the business landscape and pedestrian infrastructure near Mockingbird Station, the census data were supplemented by a second dataset comprising field observations. On-site visits were made to the Mockingbird Station area on Saturday, April 27, 2013 and Wednesday, April 30, 2013. Businesses were classified into one of fourteen classifications

(Table 1). Additionally, the businesses occupying the development may be aimed at consumers with a wide variety of demographic characteristics, independent of store classification. With this in mind, the branding of each store was documented during field observations.

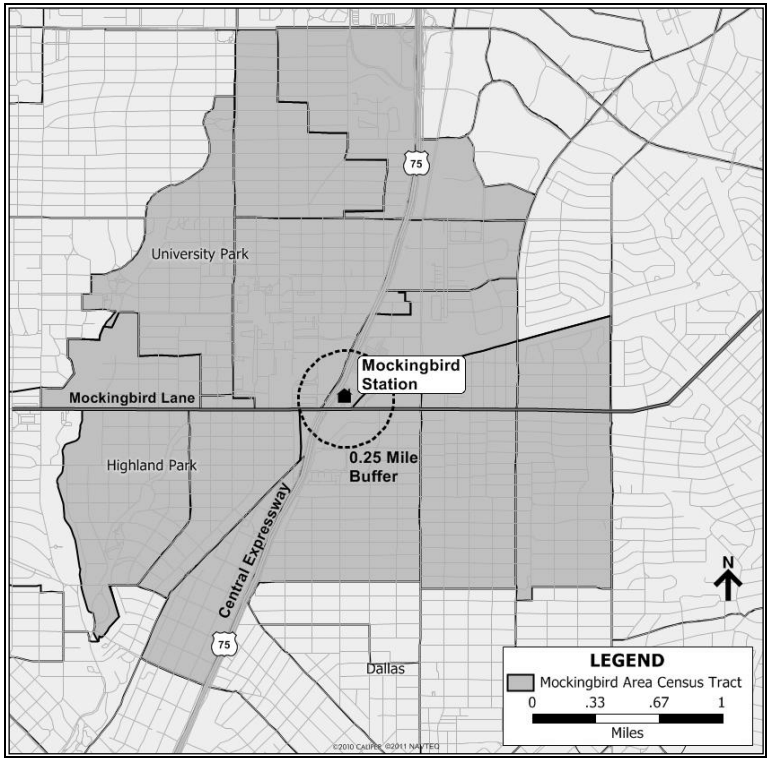


FIGURE 2  
MOCKINGBIRD STATION AREA

As suggested by Dittmar and Ohland (2004), the distance of 0.25 miles was used as a basic “walkable” distance definition. All businesses within 0.25 miles of Mockingbird Station were classified, with those in the Mockingbird Station development noted separately (Figure 2 provides a representation of this 0.25 mile radius as well). However, since 0.25 miles is not the absolute limit a person may walk, businesses visible from the edges of the 0.25 mile zone were also classified and included in this paper. This was done primarily to give some flexibility to the definition of “walkable” in terms of distance, although in order to determine walkability this research goes beyond pure distance-based accessibility. In order to assess walkability, three aspects of pedestrian-infrastructure were cataloged: presence of *sidewalks*, presence of *crosswalks*, and presence of *crosswalk timers*. Additionally, the *times given on crosswalk timers* (i.e., 10 seconds), the *number of driving lanes to cross*, and the *speed limit* of surrounding roads were all noted for further analysis as well.

## 5. ANALYSIS

To identify demographic information for the neighborhood surrounding Mockingbird Station, 1.5 mile buffers were created around the development using ArcGIS 10.1. All Census Tracts with midpoints located within that area were then used to determine the demographic characteristics of this surrounding area. Only tracts that were at least 50% within the drive time

sheds were used, leaving 15 census tracts to compose a rough neighborhood around the development. The demographic data affiliated with these tracts was then used to create a demographic profile of the neighborhood.

TABLE 1  
BUSINESS CLASSIFICATION SYSTEM

Alcohol and Tobacco
Banking and Personal Finance
Beauty and Health Care
Cleaners (Laundry) and Tailors*
Convenience*
Entertainment
Fashion
Fitness and Athletic*
Grocery*
Home and Electronics
Miscellaneous
Restaurants (Food primary)
Bars (Beverages Primary)
Medical Service*

\*Denotes "Basic Needs" Classifications: Identified by authors with guidance from the Charter of New Urbanism (2001).

Once the demographic information was understood, the business data collected in the field was analyzed using IBM's SPSS package. Two different analyses were performed on the business data. First, Mann-Whitney *U* tests were run to compare the types of stores in Mockingbird Station with those within 0.25 miles of the station. Secondly, a Mann-Whitney *U* test was run to compare difference between basic needs retailers and non-basic needs retailers, both in Mockingbird Station and in the 0.25 mile area around Mockingbird Station.

In order to determine if businesses in the area were walkable, the field data concerning pedestrian infrastructure was used to create a simple *walking accessibility index*. To do this, *sidewalks*, *crosswalks*, and *crosswalk timers* were scored either present (score of 1) or absent (score of 0) for each intersection. The time given on crosswalk timers was used in relation with the number of lanes being crossed (driving lanes) in order to incorporate both *time to cross* and *distance to cross*. The simple expression (TIME / LANES) was used to account for crosswalks that are suited for pedestrian use (with a high score demonstrating a greater potential walkability). Finally, the expression (1 / SPEED) was used to give a greater value to roads with lower speed limits. All of these scores are then averaged and totaled to provide a numerical value associated with potential for pedestrian accessibility where this infrastructure is concerned.

Given the above, and assuming:

1. 15 miles per hour would be the lowest speed limit in an urban area,
2. a crosswalk would have a minimum of two lanes, and
3. a maximum crosswalk timer of 30 seconds,

a walking accessibility index value of 18.0667 would be the highest possible score for an area:  $((1+1) + (1/15) + (30/2) = 18.0667)$ . This study thus takes walking accessibility index values over 10 to represent an area that could be considered potentially walkable.

## 6. RESULTS

A total of 42,179 people lived in the 15-tract neighborhood indicated in Figure 2 at the 2010 Census. Of these, 81% were over 18 and only 10% were over 62. In general, the area's population is young: 37% are between 20 and 39. The population is also mostly white, at 88%. African American and Asian populations are very small, at 0.2% and 0.4% each. The

area’s population density is also high, measuring 5,944 people per square mile in the tracts within 1.5 miles of Mockingbird Station. Field observations support the demographic information revealed with the Census data. Individuals within the development, either sitting outside at cafes or walking between shops, were generally white, with African American and Hispanic individuals primarily seen as service industry employees. A casual observation as a random sample, suggests that the population was young, with many college-aged groups in the area on the afternoon of April 27, a Saturday. On Wednesday April 30<sup>th</sup>, the station was largely empty of pedestrian activity. Any individuals encountered appeared to be in the area for work.

All Mann-Whitney *U* tests yielded insignificant results. However, the small number of cases in each test (Mockingbird Station versus 0.25 mile, and Basic Needs versus Other Stores) highlights an area of future research by investigating more than one development. While statistical analysis revealed little in this area, the raw data does suggest that there are differences in the types of businesses provided in the development and the 0.25 mile buffer around the development, notably more fashion stores exist in Mockingbird Station (Table 2).

TABLE 2  
BUSINESS COMPOSITION IN MOCKINGBIRD STATION AREA

<b>Business Classification</b>	<b>In Mockingbird Station</b>	<b>Within 0.25 Mile Buffer</b>
Alcohol and Tobacco	-	1
Banking and Finance	1	1
Beauty and Health Care	5	7
Cleaners and Tailors	-	5
Convenience	-	1
Entertainment	1	-
Fashion	8	1
Fitness and Athletic	2	6
Grocery	-	1
Home and Electronics	2	1
Miscellaneous	2	12
Restaurants	7	12
Bars	4	3
Medical Service	1	5

Every intersection adjacent to the Mockingbird Station development had crosswalks and crosswalk timers, and each street had sidewalks (each averaging a score of 1). Additionally, the average score for speed was 0.037, with the average score for the (TIME / LANES) category was 3.465. Thus, the overall walking accessibility index score for Mockingbird Station is 6.502 according to this approach. This approach suggests that Mockingbird Station is not as walkable as it may appear and that walkability within the area may be limited by infrastructure conditions.

## 7. DISCUSSION

Further research is certainly needed. Mockingbird Station offers a wide variety of businesses, from restaurants to salons, but the surrounding neighborhood is itself full of many diverse retail options. A stark contrast is noticeable when examining the types of retail activity that occur within the development and much of the existing activity in the surrounding area –

new mixed-used developments are intermingled with strip-center, automobile oriented retail options along Mockingbird Lane. It is evident that some basic needs retailers exist in the area - the Kroger Signature grocery store on the corner of Greenville Avenue and Mockingbird Lane, while not in the development, does fall within the 0.25 mile area and is easily accessible through the DART parking lot. Additionally, a large number of cleaners and tailors were found within the study area, as well as stores catering to fitness and athletic purposes.

However, the primary activity within the area seems to be oriented towards restaurants and bars. The young clientele, observed to range primarily from around 20 to 40 years old, appear to be targeted by the restaurants, bars, and other stores. Urban Outfitters is primarily aimed at a young consumer base, although West Elm caters towards upper-middle class, middle aged individuals. Trendy stores, in fact, are the norm within Mockingbird Station. New development along SMU Boulevard (north of Mockingbird and within the 0.25 mile area) is also aimed at this upper-middle class, young consumer base. It is only just south of Mockingbird Station, across Mockingbird Lane, that businesses appear to be oriented to consumer base with different tastes and needs. The famous Dallas restaurant Campisi's is located a quarter mile down the road, while fast food restaurants and several small, miscellaneous businesses occupy a two-story strip-center across the street. Other than the retail and service sector activity in the area, much of the remaining space is either occupied by parking space or for office uses (several office towers line the service road for Central Expressway).

Overall, in order to really understand the diversity of businesses near New Urban developments or TODs like Mockingbird Station more work is needed. Retail activity in these developments is largely unexplored (Wilson-Chavez and Rice, 2012). Future work will need to incorporate a much larger sample of developments, although the large data requirements of such research will require careful planning.

The pedestrian infrastructure connecting Mockingbird Station to areas beyond the 'walls' of the development are generally poor. Using our index to measure the potential for pedestrian movement, Mockingbird Station was found to be far from the maximum score a truly walkable area would achieve (Mockingbird Station scored a 6.502 on a scaled of 18.0667). However, this is not to say that walking from Mockingbird Station to other areas is impossible. In order to conduct this research the entirety of the 0.25 mile area was walked. While access was difficult at times, it was possible to walk safely in specific directions and corridors. For example, DART maintains a large parking area adjacent to the light rail station that allows for visually unappealing but safe pedestrian connectivity to the nearest grocery store as well as a link to the developments along SMU Blvd to the north. Connectivity to the other side of Mockingbird Lane, however, is lacking (see Figure 3). Where crosswalks exist, an individual must cross seven lanes of traffic (three driving, each way, and one turning lane), these crosswalks do have timers however several are set to short times. While a young, healthy individual can easily run across seven lanes of traffic in three seconds, this is not the case for someone pushing a stroller or individuals of any aged with reduced mobility (the disabled or elderly, for instance). In this sense, the pedestrian infrastructure fails to provide for a wide range of demographic characteristics. This may play into the existing demographics identified in Census data, but may be detrimental to mobility in other developments with different demographic characteristics.

Mockingbird Station, then, is not as walkable as a TOD ought to be. This suggests that instead of an orientation focused on pedestrians and transit users, Mockingbird Station is oriented towards the automobile. In fact, while the streetscapes within the development are designed to be pedestrian friendly, large swaths of on-street parking and valet parking give the development a feel similar to more automobile oriented developments. This aspect of the pedestrian environment is difficult to quantify – a walkable environment can have ample parking. However, visiting the development in person gives one a better feel for the ebb and flow of activity in and around the TOD. Movement of people into the development from the light rail station are noticeably smaller than those from the street, via automobile, and movement, on foot, in from the parking structures suggests that those dining or shopping within

Mockingbird Station are doing so primarily from their vehicles (if they do not live in the development already). Additionally, while there are a large number of businesses in the area beyond the development, it is unlikely that residents are visiting these businesses by foot.



FIGURE 3  
MOCKINGBIRD STATION VIEWED FROM MOCKINGBIRD LANE

## 8. CONCLUSION

This research has provided what might be viewed as a mixed but compelling set of results related to the Mockingbird Station development and TOD research more broadly:

1. The survey of pedestrian infrastructure provided here suggests that Mockingbird Station is not a pedestrian friendly environment.
2. Further research, on a broader range of developments, is necessary to firmly establish if 'basic needs' retail options are provided in a truly pedestrian environment near TODs

With the rise of TOD, cities have become more likely to establish rules and regulations that encourage walkable, mixed-use development. While the economic incentives for this type of development are one motivation (Clower *et al.*, 2011), prioritizing the pedestrian and life on the street can be of great importance to a city (Jacobs, 1961; Speck, 2013). In Mockingbird Station, there is a strong emphasis on business activity, whether it be up-scale retailing, dining, or professional services – a large number of businesses fall within the development. However, in order to move beyond the development as a pedestrian, the environment surrounding Mockingbird Station is largely uninviting. Access through a DART parking lot opens up some possibilities, but this also hindered by an at-grade crossing for the light rail line (see Figure 4).

Ultimately, we believe that strong academic and applied interest in walkability in both the academic and applied arenas will lead to more assessment of the various walkability measures currently being used. This research does not attempt to provide a standalone or ideal system for quantifying walkability, but it does argue that retail activity and pedestrian infrastructure both need to be considered when determining pedestrian accessibility to retail services. Both aspects of the pedestrian sphere can influence an individual's desire to walk to the services needed to support daily life. If these issues are not adequately considered, it is likely that walkability will be incorrectly assessed. Thus, it is important for further research to

address walkability in a comprehensive manner, making it possible to allow for efficient prioritization of scarce federal, state, and municipal resources.



FIGURE 4  
DART RAIL CROSSING NEAR MOCKINGBIRD STATION

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