

A MILLENNIAL MINDSET: HOW MODAL SHIFT AFFECTS THE TRANSPORTATION  
CHOICES OF UNIVERSITY STUDENTS

by

JESSICA WEBER

A REPORT

Submitted in partial fulfillment of the requirements for the degree

MASTER OF REGIONAL AND COMMUNITY PLANNING

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

KANSAS STATE UNIVERSITY  
Manhattan, Kansas

2016

Approved by:

Major Professor  
Dr. Brent Chamberlain

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JESSICA M. WEBER

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## **Abstract**

Growing urban populations and the increasing prevalence of the millennial generation are profoundly changing personal travel behaviors and patterns. As a result, cities, planners, and developers must understand and act upon the shifting preferences and expectations of these public transit users in order to align costly public transit services with user needs in efficient ways. While public transit systems are becoming an increasingly vital part of urban life, few jurisdictions have considered the need to tailor these systems to millennials – those most likely to incorporate public transit into their daily lives. This paper examines the travel behaviors of University Students engaged in a forced travel intervention caused by a sudden relocation of their work site. The change in work location encouraged the use of a free public transit system as means of commuting. Longitudinal survey results, taken pre and post-intervention, indicate statistical differences between transit preferences and actual habits related to transit use and other modes of travel. Survey findings suggest that there is a statistically significant difference between the stated willingness and actual travel behaviors of public transit users and of drivers, and that modal shifts can assist in overcoming the attitude/behavior split related to personal travel among millennials.



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Jessica Weber  
Master of Regional and Community Planning  
Spring 2016

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In addition, the data set upon which this research was grounded was collected with the support of the Flint Hills Area Transportation Agency, who provided student incentives for completing the survey on which this study depended. I thank this agency for their support and feedback. Lastly, a sincere thank you to the students in *Environmental Landscape Planning and Design, (Spring 2015)* for creating and distributing the pre-intervention survey. This project could not have taken place without your work and forethought.

## PREFACE

This report developed from my passion and interest in sustainable transportation options that reduce the need and desire for the personal automobile. For many, personal travel is limited through automobile dependency; for those of who are not limited, the marginal cost inflicted upon society is greater than most are aware. This research was intended to explore solutions to transportation that begin with the individual, who on a daily basis, makes decisions about personal travel. The decision to switch mode use should not be as challenging as it is. This research presents insights to help understand why people travel the way they do, and what cities can do to provide opportunities for sustainable mode use in the future.

The report consists of five chapters prepared for submission to *Transportation Research Part A: Policy and Practice* international journal: Chapter 1, Introduction (page 12), Chapter 2, Literature Review, (page 15), Chapter 3, Methodology (page 21), Chapter 4, Analysis (page 25), and Chapter 5, Discussion (page 34). The chapters were written by me, with technical support and expertise provided by Dr. Brent Chamberlain, Dr. Gregory Newark, and Dr. Matthew Sanderson.



# CHAPTER 1 | INTRODUCTION

## 1.1 THE DILEMMA

Transportation policies in the United States assume that driving will continue to increase (Frontier Group, 2012), but in reality personal transportation and generational responses to modes of travel are changing in the United States (Varga, 2014). The millennial generation (individuals born 1983 – 2000) is now the largest generational cohort in the United States (Frontier Group, 2013), and has greater preference towards non-auto-centered forms of transportation than previous generations, including walking, biking and public transit (Polzin, 2014; Kloke, 2014). Smart phone technologies are helping mold this preference by changing travel attitudes and activity engagement of transit users (Lisco, 1968; Frei, 2013), and can be used to deliver convenient, real-time interfaces which can increase transit ridership (Halsey, 2013). Aside from smart phone technology, additional ways to increase transit ridership have been widely seen for the commuter workforce, regular and irregular transit users (Krizek & El-Geneidy, 2007; Cervero, 2006; Chowdhury & Ceder, 2013), and through the guidelines of Transit Oriented Development Policy (TOD) (Kolko, 2011; Barbeau, 2014; McCullough, 2012), although little evidence ties the specific preferences and choices of the millennial generation to future policy implications of those preferences. As millennials are now the largest generation in the United States, their choices are critical in determining the needs of future transportation infrastructure (Frontier Group, 2013).

This research addresses ways to better understand the mobility choices of millennials by investigating habits and behaviors surrounding the shift from automobile user to transit user through a forced intervention. However, little research has been done on modal shifts to date (Fuller et. al. 2013), and largely, interventions have met only moderate success (Guell et. al, 2012). This study utilizes approximately 600 students in Manhattan, Kansas (Figure 1) who were investigated as to how a sudden relocation of a work site (a behavioral intervention) affects their transit choices and associated behaviors. This research is intended to grow empirical knowledge about millennial habits to improve policies and incentives needed to support convenient and desirable transit development targeted towards this generation.

Furthermore, this study investigates to what extent transit expectations are aligned with the reality of transit use and the degree to which self-reported behaviors are reliable.

### MANHATTAN, KANSAS

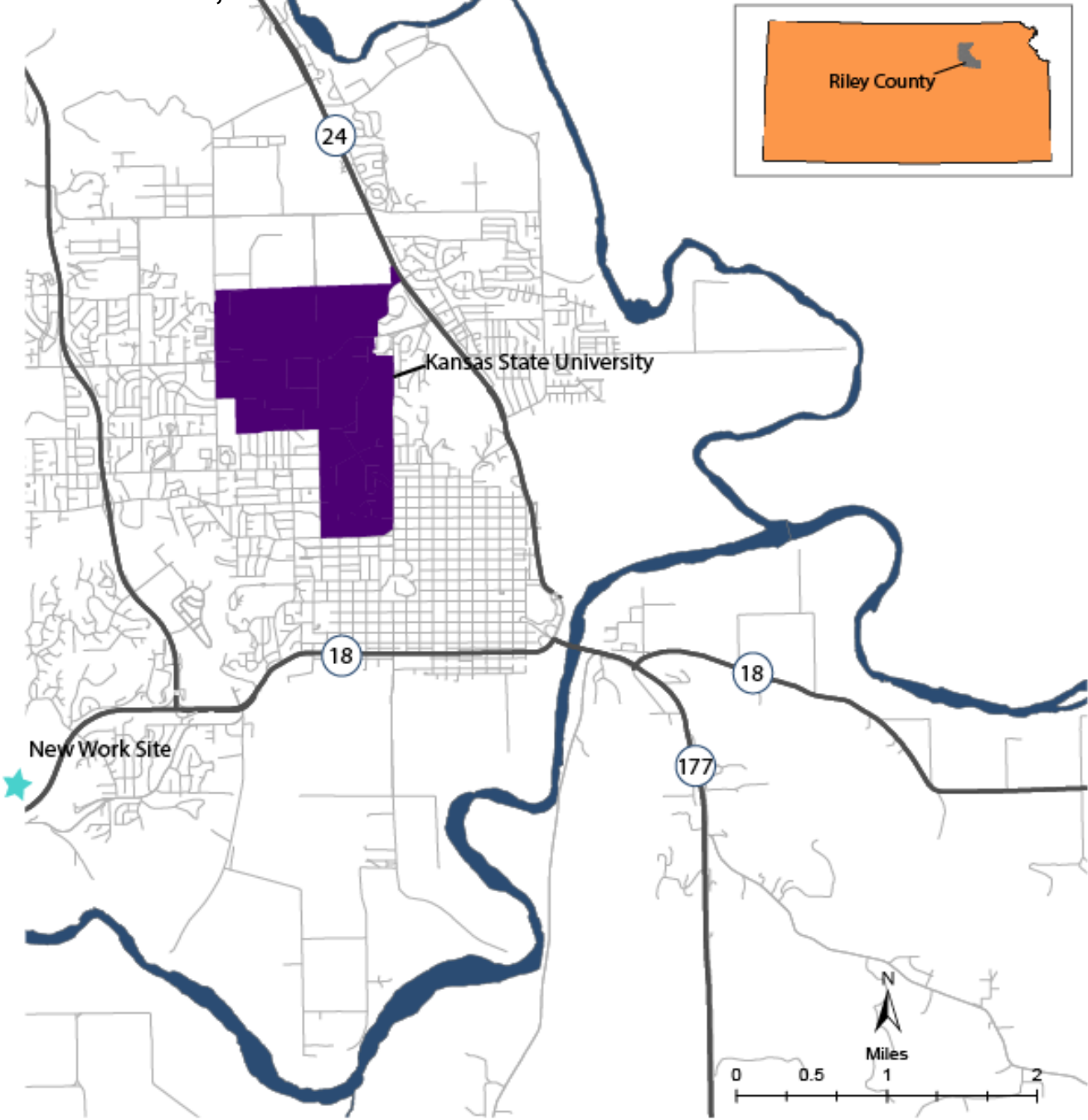


Figure 1 A reference map of Manhattan, Kansas, the study site for this investigation (Image by Author, 2015).





# CHAPTER 2 | BACKGROUND

## 2.1 LITERATURE REVIEW

The 2012 Urban Mobility Report estimates that, in 2011, an increase of 5.5 billion travel hours were spent across 498 metropolitan areas due to congestion (FHWA, 2015), and The Texas Transportation Institute notes that traffic in the United States has increased approximately five percent since the recession of 2007 (Schrank et. al., 2015). The Federal Highway Administration (FHWA) focuses on congestion relief efforts that are highway-centered, such as tolling, pricing and accident management methods. Public rapid transit, however, avoids such additional costs and allows riders to use travel time in other ways, such as reading or other leisure activities. A study on the subjective value of time, as related to urban transit, indicates that attitudes and engagement in travel activity can influence a travelers' value of time (Lisco, 1968). The study saw that many transit riders view transit to be a more efficient use of time and money than driving (Lisco, 1968). Meeting the challenge of actually making a modal shift from car to transit user, however, requires changing the accepted habits and norms that shape one's daily life.

### 2.1.1 Modal Shifts and Interventions

The concept of a modal shift is complex and involves an understanding of how attitudes affect behavior choices (Abou-Zeid, & Ben-Akiva, 2012; Anable, 2005; Ben-Akiva & Lerman, 1985). Travel choices differ for distinct groups of people; psychographic segmentation is one method that can be used to divide populations to understand various ridership markets (Anable, 2005) while The Decision Rule, defined by Ben-Akiva and Lerman as an internal means of processing available information and making a unique choice, defines the process in four parts: Dominance, Satisfaction, Lexicographic Rules, and Utility.

Research has found that sociodemographic characteristics such as age, level of education, and income remain relatively stable within various categories of psychographic segmentation (Anable, 2005). Sociodemographic differences, however, can be associated with personal values; for instance, power is more commonly seen in men, who value flexibility and convenience of transit, while age is correlated to habitual behaviors. Overall, personal values reflecting power, fulfillment and security are shown

to affect attitudes towards flexibility, comfort and convenience, and ownership, attributes which influence mode choice decisions (Paulssen et. al., 2014). In addition, a person's internal value and belief system (which may be influenced by culture and social background) (Porteous, 1977) can indicate attitudes toward mode choice. A study using an integrated choice and latent variable model found the value-attitude-behavior model of cognition can provide insights to planners and policy-makers on how to sell transit to users (Paulssen et. al., 2014).

Socio-economic factors also affect the decision to make a modal shift, according to two studies conducted at MIT University and in Switzerland in which the same research methods generated two differing results. Social influences affecting attitudes towards transit, cost-consciousness, and predisposition towards transit use may affect the decision to switch modes (Abou-Zeid, & Ben-Akiva, 2012). These studies show that different modal shift interventions are needed for different types of people (Abou-Zeid, & Ben-Akiva, 2012) and that the culture and subculture groups to which we belong mold our opinions and activities (Porteous, 1977). Interventions may also be most effective in groups where there are other habitually related choices (de Bruijn et. al., 2009). Largely, interventions have met only moderate success due in part to different assumptions formed across the many disciplinary fields seeking to understand mode choice behaviors (Guell et. al, 2012).

Few studies have been done to date on modal shifts associated with new city-wide transit programs, and their cause and effect on transit behavior (Fuller et. al., 2013). One study in Montreal studied modal shift following the implementation of a public bike share program. A survey showed the majority of bike share users shifted from other modes and tended to integrate multiple active modes of transportation in single trips. Overall, the change in behavior was small and complex. The study notes that these shifts are often more complex than what the concept of "modal shift" implies (Fuller et. al., 2013). Other studies have found that modal shift is strongly influenced by distance to work and travel time, thus, public policy increasing park and ride opportunities and improving the travel time burden could encourage the modal shift (Nurdden, et. al., 2007). However, the circumstances under which a modal shift occurs, and the positive

or negative connotation of the circumstance, may be another contributing factor. A study seeking to gauge modal shift following a major road closing found that after being forewarned of the impending highway closure, people simply did not make the trip at all (Taylor and Wachs, 2012). Detour routes, public transportation and the highway itself all saw a decrease in the number of travelers, meaning that people chose to temporarily avoid the route altogether (Taylor and Wachs, 2012).

The complexities of personal behaviors are further understood in a study formed around the theory of planned behavior, in which intentions can predict with high accuracy one's behaviors based upon attitudes, subjective norms and perceived behavioral control (Ajzen, 1991). College students were investigated in a longitudinal study to determine the effects of an intervention (a pre-paid ticket) on the use of their bus system. A study of the influence of past behaviors on future choices was also conducted, and was found to improve the prediction of future behavior until the point of the intervention, at which point the past behavior was no longer predictive. The study concluded that interventions do produce changes in attitudes and subjective norms, and that past travel choices only determine future behaviors if circumstances remain relatively stable (Bamberg et. al., 2003). Attitudes overall reflect a tendency – they are not prescriptive (Porteous, 1977).

Behavior can also be understood through influence by the environment. From an ecological perspective, behavior may be considered a part of the system rather than an aspect of the individual as people are merely members of a larger interconnected activity network (Porteous, 1977). Different types of environment have been identified as a means of rationalizing a wide variety of contexts. Sonnenfeld's (1972) nested hierarchy of environments, from broad to narrow, include geographical, operational, perceptual and behavioral environments. This hierarchy narrows from the individual's entire external universe, to the portion the individual is aware of, to the environment that elicits a specific response (Porteous, 1977).

### **2.1.2 Transit Preferences**

The decision to use transit is affected most by wait times (at levels two to three times higher than in-vehicle time) and the availability of service at both ends of the trip (Krizek & El-Geneidy, 2007). Similarly, studies find that walk time is rated 2.2 times higher than

riding time (Walker, 2012), and often, the value associated with time is considered higher than the cost of the trip itself (Krizek & El-Geneidy, 2007). A study that categorizes the population into eight types of transit riders focuses on marketing to the “middle ground” of potential transit users, and seeks ways that transit agencies might cater to their preferences. “Choice riders” and “potential riders” are two sectors of the transit market that can be attracted to, or dissuaded from using transit. The market group tends to favor reliability, travel times, type of service, and comfort the most (Krizek & El-Geneidy, 2007). Even proximity to transit may not explain the adoption of regular transit use, but those who actively develop engaging activities while using transit are more likely to become choice riders (Brown et. al, 2003). Brown’s study also found that transit use was more often seen in males, individuals without parking passes, and people who perceived the quality of service to be high (Brown et. al, 2003). In general, studies indicate that transit ridership will be a choice based largely on the experience it provides. For instance, if the transit car became valued as a gathering spot, it could become far more appealing than it has been in the past (Nordahl, 2008).

In addition, making transit a preferred choice of mode will require much of the same levels of physical, economic, and social support that the automobile provides (Brown et. al, 2003). Behavior change from automobile to transit is not motivated by secular priorities like lowering pollution levels, but by immediate personal benefits for each individual (Brown et. al, 2003). These personal benefits can be supported by policy, design and the image the transit system conveys to the public (Brown et. al, 2003). Image is important because, although buses carry the most passengers in all major markets except Atlanta, New York, Boston, and Washington D.C., they are often perceived as smelly, dirty and crowded (Dunphy et. al., 2003).

### **2.1.3 Public Policies**

Today’s transportation policies reflect the mid-20th century, and should be renewed to evaluate the impacts of new technologies and development patterns’ impact on mobility, accessibility, and an individuals’ desire to drive less (Frontier Group, 2013). The practices of Transit Oriented Development (TOD) are gaining popularity in cities across the country (Calthorpe, 1993), and broadly focus on themes of connectivity, density,

diversity and design (Kansas City TOD Policy Draft, 2015). However, each community is different; policies such as parking should be demand-based and locally calibrated (Willson, 2005).

Public-private partnerships have succeeded in creating innovative mobility solutions for local governments by creating new best practices for the industry (Connected Urban Mobility, 2015). The public-private partnership can play a large role in attracting private enterprise and bringing investment into a transit corridor. These partnerships often start with public funds as means of kick-starting the financing package (Nordahl, 2008).

Other ways of gaining public support are through online interfaces and transit benefit programs. A transit entity's online presence and public perception can be unrelated to a system's service (Davies, 2015) and can be a strong way to gain public support. However, a poor quality online presence may cause users to perceive a poor quality system, when in reality, the contrary may be true. Benefit programs providing tax-free assistance to employees can be an effective way of increasing ridership and revenues and decreasing other costs (Ecola, 2008). In general, policy approaches need to be comprehensive, addressing system design, policy development and socio-behavioral aspects (Brown et. al, 2003). This is because transit experiences are varied, so it is critical to appeal to the entire transit experience (Brown et. al, 2003). Public policy, however, is not the cure-all when it comes to the financial and economic predicaments of transit. Ridership numbers themselves are largely unresponsive to public policy, as they are dominated by market forces and social elements (Li & Wachs, 2004).

# CHAPTER 3 | METHODOLOGY

### 3.1 INVESTIGATIVE FRAMEWORK

This research attempts to understand the relationship between the attitudes and behaviors of millennials, and their associated transportation choices pre and post-modal intervention. This research is based on longitudinal survey results of Kansas State University Students within the College of Architecture, Planning and Design (APDesign) in Manhattan, Kansas. This largely auto-centered city is part of the fastest growing region in the state, and is served by the Flint Hills Area Transportation Authority's aTa Bus (Figure 2). Four local routes through Manhattan are provided by aTa Bus, and a separate route has been implemented specifically for approximately 600 APDesign students as transportation to and from an off campus studio. The new studio is located approximately eight miles, a 20 minute bus ride, from campus. This route will serve as the basis for the survey questionnaire and analysis in order to investigate how a sudden relocation of a work site (a behavioral intervention) affects transit choices and associated behaviors, and how these choices inform policies needed to support convenient and desirable transit development targeted toward millennials.

The post-intervention survey is a continuation of a pre-intervention survey completed in the year before. The pre-intervention survey was conducted in March 2015, by students in a graduate seminar course in the College. The post-intervention survey includes slight modifications to enrich future data collection (all modifications noted in the Analysis). The March 2015 survey provided 293 student respondents along with their typical Wednesday and Thursday activity and travel contexts by which to compare spring 2016, post-relocation survey results. Longitudinal results reveal the statistical difference between perceived willingness and actual use of public transit under forced intervention conditions. A series of descriptive statistics further provides an understanding of the aggregate difference between both pre- and post-intervention survey results.

In order to understand attitudes and behaviors related to transit use, the post-intervention survey assesses individuals' ecological perspectives in order to ascertain if there are any correlations between these perspectives and the use of transit (note that the pre-intervention survey did not gauge environmental preferences). These questions



follow the New Ecological Paradigm (NEP) scale, a survey-based metric created by environmental sociologist, Riley Dunlap to address the weaknesses with the original NEP metric (Dunlap, 2008). Using a Likert scale, respondents indicate their level of agreement with fifteen environmentally-focused statements, or items. The NEP scale is considered to be a reliable and valid method for understanding one's world view (Anderson, 2012) and is commonly used in before-and-after studies resulting from an intervention or activity (e.g. Steel et. al, 2015; Harraway et. al, 2012; Shephard et. al., 2009). Critics of the NEP scale question its dimensionality, biocentric and ecocentric world views, and validity of scale. However, the NEP metric remains the most widely accepted measure of environmental world views and continues to provide a valuable measure of environmental sensibility (Anderson, 2012).

**Figure 2** aTa Bus, Manhattan, Kansas (Image by Author, 2015)





# CHAPTER 4 | FINDINGS

## 4.1 ANALYSIS

Post-intervention survey results remain consistent with the original survey by analyzing the same cohort of students from 2015 (1st-4th year students) to 2016 (2nd-6th year students). These groups include only those affected by the intervention, excluding students who graduated prior to the intervention and the incoming first year students of 2016, whose work location remained on campus. A small number of 6th year students are included as they represent students in a two year post-baccalaureate program. The spring 2015 survey issued in anticipation of the modal intervention collected 293 respondents from a sampling frame of approximately 600 millennials across eight degrees within APDesign. Of these, 251 respondents were 1st-4th year students. These numbers represent consistency with the post-intervention survey, which was similarly composed of 184 respondents of the same sampling frame, 174 of which were 2nd-6th year students. The majority of respondents for both surveys were non-baccalaureate Master of Architecture Students (M, ARCH), followed by Master of Interior Architecture and Product Design (M, IAPD) students. Table 1 provides a demographic comparison between pre- and post-intervention surveys, as well as the data that will serve as the basis for an analysis and discussion surrounding use and frequency of modes before and after the modal intervention.

**Table 1. Pre- and Post-Intervention Comparisons**

	Pre-Intervention 1st-4th Year Students				Post-Intervention 2nd-6th Year Students			<i>p-value</i>	
	<i>Mean</i>	<i>S.D.</i>			<i>Mean</i>	<i>S.D.</i>			
<b>Respondent Field &amp; Program</b>									
<i>MRCP, (PB)</i>	1%	--			2%	--		--	
<i>MRCP, (NB)</i>	2%	--			8%	--		--	
<i>M, ARCH (NB)</i>	38%	--			43%	--		--	
<i>M, ARCH (PB)</i>	2%	--			5%	--		--	
<i>MLA, (NB)</i>	12%	--			14%	--		--	
<i>MLA, (PB)</i>	2%	--			2%	--		--	
<i>MS, ARCH</i>	14%	--			7%	--		--	
<i>M, IAPD (NB)</i>	20%	--			15%	--		--	
<i>M, IAPD (PB)</i>	4%	--			1%	--		--	
<i>Other</i>	5%	--			2%	--		--	
<b>Respondent Year in Program</b>									
<i>1st</i>	28%	--			--	--		--	
<i>2nd</i>	27%	--			27%	--		--	
<i>3rd</i>	22%	--			31%	--		--	
<i>4th</i>	23%	--			14%	--		--	
<i>5th</i>	--	--			24%	--		--	
<i>6th</i>	--	--			3%	--		--	
<b>Mode Ownership</b>									
<i>Automobile</i>	0.60	0.49			0.86	0.35		<.001	
<i>Bicycle</i>	0.44	0.50			0.56	0.50		0.02	
<i>Skateboard</i>	0.08	0.28			0.05	0.22		0.19	
<i>Motorcycle</i>	0.02	0.15			0.02	0.13		0.63	
<b>Ecological World View</b>									
<i>NEP Responses/Person</i>	--	--			5.88	0.20		--	
<i>DSP Responses/Person</i>	--	--			2.33	0.18		--	
			<b>Measured</b>		<b>Reported</b>		<b>Measured</b>		
	<b>Mean</b>	<b>S.D.</b>	<b>Mean</b>	<b>S.D.</b>	<b>Mean</b>	<b>S.D.</b>	<b>Mean</b>	<b>S.D.</b>	<b>p-value</b>
<b>Mode Usage to APDWest</b>									
<i>Transit</i>	0.47	0.26	--	--	0.29	0.32	--	--	<.001
<i>Drive Alone</i>	0.28	0.22	--	--	0.47	0.34	--	--	<.001
<i>Carpool</i>	0.30	0.18	--	--	0.24	0.24	--	--	0.01
<b>Distance to School</b>									
<i>Seaton</i>	--	--	--	--	--	--	1.47	0.08	--
<i>APDWest</i>	--	--	--	--	--	--	3.92	0.14	--
<b>Share of Mode for All Trips</b>									
<i>Transit</i>	--	--	0.01	0.01	--	--	0.11	0.02	<.001
<i>Drive Alone</i>	--	--	0.32	0.03	--	--	0.42	0.03	0.01
<i>Carpool</i>	--	--	0.05	0.01	--	--	0.09	0.01	0.03
<i>Bicycle</i>	--	--	0.11	0.02	--	--	0.05	0.01	0.01
<i>Walk</i>	--	--	0.51	0.03	--	--	0.24	0.02	<.001
<b>Share of Travel Time for All Trips</b>									
<i>Transit</i>	--	--	0.00	0.00	--	--	0.05	0.17	<.001
<i>Drive Alone</i>	--	--	0.26	0.04	--	--	0.40	0.38	0.00
<i>Carpool</i>	--	--	0.01	0.00	--	--	0.08	0.14	<.001
<i>Bicycle</i>	--	--	0.09	0.02	--	--	0.24	0.31	<.001
<i>Walk</i>	--	--	0.63	0.04	--	--	0.19	0.24	<.001

**\*Willingness** refers to the extent students are favorable of using a mode, prior to experiencing the modal intervention, as measured through a Likert Scale

**\*Measured** use refers to travel data derived from two-day trip diaries, both pre- and post-intervention

**\*Reported** use refers to the extent students state they actually use a mode throughout a work week, as measured through a Likert Scale

#### **4.1.1 Understanding the Survey Population**

Survey results indicate that, on average, millennials owned more vehicles following the modal shift than prior to the intervention. Increased bicycle, and decreased motorcycle and skateboard ownership also follow the intervention (note that “motorcycle” was specified as gas-powered in the post-intervention survey and not specified by motor in the pre-intervention survey). At the 95% confidence level, there is a statistically significant difference between pre- and post-intervention automobile and bicycle ownership (Table 1), the two modes that can most easily be utilized to travel the eight mile distance to the off campus location. Another associated behavior, campus parking pass ownership, saw a decrease pre-intervention to post-intervention, from 49% to 35% of respondents, even as the parking garage is located adjacent to the off-campus aTa Bus shuttle stop.

When asked about environmental preferences, post-intervention 2nd-6th year respondents indicated an overwhelming preference towards New Ecological Paradigm (NEP) views, signifying a high level of environmental concern (Table 1). These enduring values are thought to be stable within an individual, not changing over time the way attitudes and behaviors might (Paulssen et. al., 2014). Of the seven DSP questions and the eight NEP questions, the majority of respondents endorsed 6 to 8 of the NEP items, or an average of 5.8 NEP responses per person (Table 1).

#### **4.1.2 Perceptions of Mode Use**

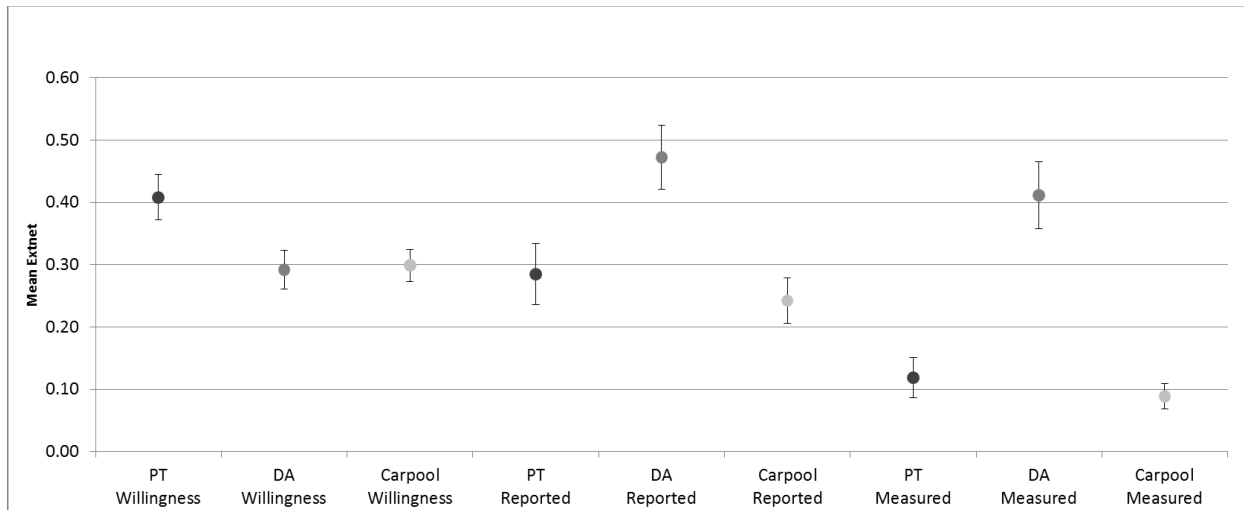
On a Likert scale of 1-10, 31% of pre-intervention 1st-4th year respondents perceived their willingness to use public transit as a means of commute to the off-campus work location at an 8-10 level; 19% indicated willingness between 4 and 7, and the remaining 34% indicated willingness between 0 and 3. Compared to post-intervention survey results in which students were asked to report their actual travel behaviors on the same Likert scale, there is a 30% aggregate difference between stated willingness and reported use of public transit, a 61% aggregate difference between willingness to drive alone and actual drive-alone behaviors, and a 19% aggregate difference between willingness to carpool and actual carpooling behaviors. At the 95% confidence level, there is a statistically significant difference between willingness and reported travel behaviors among public transit, drive alone, and carpooling behaviors, seen in Table 1.

Millennials perceived their willingness to use public transit as higher than both their willingness to drive alone or carpool, while driving alone is actually the highest reported modal use.

Table 1 also represents measured mode use (see Share of Mode for All Trips in Table 1), as determined by millennials' Wednesday and Thursday trip diaries. The two-day trip diaries, recorded both pre- and post-modal intervention, collected the total number of daily trips and mode type of each trip (note that measured use does not only include modes used to APDWest as willingness and reported travel statistics do). The aggregate results show a statistical difference between all mode types, pre- and post-intervention. Transit, driving alone, and carpooling behaviors saw an increase following the modal shift, while bicycling and walking behaviors declined.

When comparing only post-intervention survey results between willing, actual, and measured travel behaviors, there is a statistically significant difference between public transit and carpooling behaviors, with measured use falling below what millennials stated they are willing to do, and below what they perceive they are actually doing. Millennials have a better perception of their drive alone behaviors (which they indicate to be their least preferred mode) as measured drive alone behaviors have greater similarity to reported use. Figure 3 provides the relative mean extent values and margin of error of respondents' willingness, reported, and measured use of public transportation (PT), drive alone (DA), and carpool modes following the modal intervention.

**Figure 3. Stated Willingness, Reported, and Measured Mode Uses**



**\*Note:** *Measured* modal use was determined through two-day trip diaries, unlike *willingness* and *reported* measurements which were determined by Likert Scale

At the 95% confidence level, Figure 3 indicates that for each mode, the perception of travel time (reported behavior) is significantly greater than measured, with exception of DA. The largest difference is seen between carpooling and public transit. These differences may indicate that respondents include the time it takes to walk to, wait for, coordinate, or park into the travel time, thus altering perceptions and attitudes surrounding use of the mode itself.

#### 4.1.3 Millennial Daily Travel Diaries

In order to measure the actual daily use of sustainable and non-sustainable travel modes against millennials' perceptions of mode use, survey respondents were asked to log their Wednesday and Thursday travel behaviors, indicating exact destination locations, mode type, and arrival and departure time for each location. Of the 2nd-6th year 2016 survey respondents, 851 trips were made on Wednesday and Thursday, an average of 4 trips per individual each day. Of these trips, approximately 24% were done by walking, 5% by biking, 11% by public transportation, 9% by carpooling, and 42% by driving alone (Table 1).

Logging the exact hour and minute of trip arrival and departure produced more than a dozen response inconsistencies that were excluded from the dataset. Exclusions include trips that were unreasonably long and that did not correlate with the travel



location or mode, as well as blank responses. This response error may in part reflect the reliance on the recall technique, which can produce more error than if the participants are notified ahead of time (Richardson et. al., n.d.). To avoid inconsistencies with reported travel time, the Google Maps API was used to determine consistent travel time reporting to/from each location, as dependent upon mode type. While the Google Maps API may have the propensity to under or over-estimate travel times, estimates were applied equally to all responses, so the difference is relative as applied to this research. Travel time provided by the API is used to determine the share of travel time utilized for each mode (Table 1).

#### 4.1.4 Binary Logistic Regression

Following the analysis of attitudes' and behaviors' role on the use of travel mode, a binary logistics regression was developed using R Statistics to understand the additional factors that affect the decision to use public transit. The model includes only those students making trips to the new work location (i.e. those directly affected by the intervention). A logistic regression serves to predict a categorical variable from a set of predictor variables. Table 2 provides three statistically significant variables in determining public transit use of the students affected by the modal intervention: distance to campus, ecological paradigm view, and year in program. Note that public transit use is determined by any amount of transit use greater than 0 throughout a typical week, and that the model excludes a small number of outlier Ph.D. students as well as those students who did not identify with a program in the survey.

**Table 2. Binary Logistic Regression – Public Transit Users**

	<b>MLE</b>	<b>LogOdds</b>	<b>Std. Error</b>	<b>Z Value</b>	<b>Pr(&gt; z )</b>
<b>(Intercept)</b>	0.8366	2.3085	0.9350	0.895	0.3709
<b>Distance to Seaton (mi)</b>	-0.9222	0.3976	0.3635	-2.537	0.0112 *
<b>Ecological Paradigm</b>	1.3646	3.9141	0.6305	2.164	0.0304 *
<b>Year in Program</b>	-0.4772	0.6205	0.2004	-2.381	0.0173 *

The binary regression model shows that distance to Seaton Hall, the original on-campus studio location and building nearest the aTa Bus shuttle stop, is a significant factor in determining transit use. Intuitively, these results indicate that the farther one is located from a transit stop, the less convenient transit becomes, implying the need for additional shuttle stops and greater access to aTa Bus around the city. The negative maximum likelihood estimates (MLE) also indicate the lower the year in school, the more likely one is to utilize public transportation. Likewise, the more NEP responses given (i.e. the more ecologically focused one is), the more likely the respondent is to utilize transit. Ecological preference, however, was only a significant factor in combination with distance to Seaton Hall and year in program. Younger students are more likely to live on campus near the shuttle stop, showing these are convenience factors that correlate to ecological paradigm. These findings support previous research by Nurdden et.al. (2007), that modal shift is strongly influenced by distance to work and travel time. Additional model interactions were tested between ecological paradigm and distance to campus, between distance to campus and year in program, and between year in program and ecological paradigm. These interactions were not significant indicators of public transit use.

The log odds of the coefficient of the distance variable shows that for every mile from Seaton Hall, the odds of taking the bus go down by ~60%. For each unit increase in ecological paradigm, the odds of taking public transit increase by ~291%, and for each additional year in school, the odds of taking transit decrease by ~40%.

Chi-squared statistics are used to test the hypothesis of no association between groups. The chi-squared test resulted in the statistically significant value of 0.0021 for this model, showing that it is plausible that the data emanates from a logistic regression model that includes not only a constant term, but also the three independent variables listed above.

To further measure the model's goodness of fit, Cox and Snell's Pseudo  $R^2$ , resulting in 0.1222, represents the improvement of the full model over the intercept model, where the maximum value is not 1. Nagelkerke's Pseudo  $R^2$ , resulting in 0.1721, adjusts Cox and Snell's so that the range of possible values extends to 1

(when  $L(M_{full})=1$ , then  $R^2 = 1$ ; when  $L(M_{full}) = L(M_{intercept})$ , then  $R^2 = 0$ ) (IDRE, 2016). Lastly, Tjur's Pseudo  $R^2$  is another method used to understand variation in regression models, done by calculating the coefficient of discrimination, or the difference between the averages of fitted values; Tjur's  $R^2$  results at 0.1155 for this model. Thus, the model does not improve predictions to a large extent, but presents value in explaining a small fraction of the variance that exists within the presence of a large amount of "noise" taking place in a university setting – that is, the many additional variables not gathered in this survey that play a role in directing one's habits.

#### 4.1.5 Linear Regression Model

A similar model was created to determine the variables that affect the share of travel time millennials' spend using sustainable travel modes given the new environment created by the intervention. Sustainable modes include carpooling, walking, biking, and public transit. As with the previous model, the regression model accounts only for those students making trips to the new work location. The model output (Table 3) shows that car and parking pass ownership, distance to Seaton Hall, ecological paradigm and year in program are statistically significant variables.

**Table 3. Linear Regression – Sustainable Travel Modes**

	<b>Estimate</b>	<b>Std. Error</b>	<b>T Value</b>	<b>Pr(&gt; z )</b>
<b>(Intercept)</b>	1.3163	0.1502	8.765	3.13e-14***
<b>Car Owner</b>	-0.4003	0.0854	-4.685	8.27e-06***
<b>Parking Pass</b>	-0.1989	0.0594	-3.351	0.00111**
<b>Log Distance to Seaton (mi)</b>	-0.2292	0.0974	-2.353	0.02047*
<b>Paradigm as Value</b>	0.1599	0.0689	2.332	0.02160*
<b>Year in Program</b>	-0.0508	0.0236	-2.154	0.03348*

The model indicates that sustainable mode usage declines ~40% among car owners, an additional ~20% among parking pass owners, and an added ~22% for the log of every mile from Seaton Hall. As the previous model shows, for each unit increase in

ecological paradigm, the likelihood of sustainable mode usage increases, as well as among younger students.

While this model predicts one-third of variations in response ( $R^2=0.3154$ ), it also reiterates the findings of the previous model, showing the youngest of millennials are more inclined toward sustainable modes of travel, and that factors making the automobile more convenient than alternative modes negatively affect sustainable mode use.

#### **4.1.6 Study Limitations**

This study is limited to millennials using a non-traditional fixed route transit service with only one stop within the city of Manhattan. Respondents use the transit service with a small group of familiar peers rather than unfamiliar citizens associated with a regular city-wide service. These limitations may reduce the ability of the study to represent traditional transit systems on a large scale, but does provide for a highly controlled study.

# CHAPTER 5 | DISCUSSION

## 5.1 ATTITUDES AND BEHAVIORS

Findings are similar to previous research, showing that there is a significant difference between what travelers indicate they are willing to do in the future, and the travel behaviors that actually take place during a typical work week (Anable, 2005). These differences support the theory of the attitude-behavior split, in which only a weak correlation exists between attitudes and environmental behaviors (Hini et. al., 1995). Habits override decision making and choices related to travel behavior, having a greater influence than attitudes and intentions. Intentions play a stronger role only when habit strength is weak (Guell et. al., 2012, de Bruijn et. at., 2009). Notable in this study, public transportation is the mode respondents indicated they were most willing to use, but in reality, was the second chosen option of those surveyed when comparing vehicular modes, even though nearly half (46%) of the respondents perceive the aTa Bus to be on time 81-100% percent of the time. This indicates that lack of transit use is not due to an unreliable transit service. Similarly, driving alone is the least preferred mode, but by far the most utilized mode, even as millennials indicate that auto-reducing options such as public transit and carpooling sound like worthy ideas that align with ecological ideals and preferences.

The complexities of daily life, such as multiple trip making, altering schedules from day to day, and limited time between activities, seem to demand the flexibility that the automobile provides, even over a free fixed route transit service. Findings may reflect the fact that the millennials surveyed were aware of the upcoming modal intervention many months before the shift occurred, allowing time to make personal accommodations. This, along with the fact that public transit schedules were not provided to students in advance of the semester, may explain the increased automobile access post-intervention, as uncertainties may lead to additional levels of personal preparedness in advance of a modal intervention.

Findings counterintuitively indicate that millennials with no transit experience prior to attending Kansas State University were those that used the free public transit service the most often. This group of students correlate to the younger aged students the binary model showed to be higher users of public transit. These results support previous

research by Bamberg et. al., who found that past behaviors only predict future behaviors up to the point of the intervention, after which past behaviors are no longer predictive (Bamberg et. al., 2003). Other explanations may be the high expectations placed upon the free transit system by experienced users – those who may have developed predispositions about transit itself. These may have resulted from transit systems with convenience features such real-time interfaces, location tracking, and Wi-Fi, technologies that the aTa Bus does not offer. If users found such inconsistencies with the aTa Bus transit service, they may decide the service is not worth their time.

Overall, if transit is not perceived as the most convenient option, findings indicate the service won't be highly used, even under forced intervention conditions and availability of a free student service. While findings indicate that 25% percent of respondents do use the public transit service as their travel mode to the work location 81-100% of the time, the propensity to drive far outweighs transit, as nearly half of respondents drive alone 81-100% of the time. Transit may never be the dominant replacement of the private car, nor, some argue, should it be (Walker, 2012). As such, strategic policies may need to account for technological innovations such as the driverless car (Shladover, 2015), Uber (the new on-demand transportation service that is challenging the use of personal vehicles), and other car sharing networks like Modo, Autoshare and Zipcar (McCullough, 2012). However, opportunity costs of using Uber or other transit services still depend on the degree to which people value their time (Silver & Fischer-Baum, 2015).

### **5.1.1 Policy Implications**

Krizek and El-Geneidy (2007) note that “choice riders,” as defined by Jin et.al. (2005) are riders who have several modes of travel available, but may prefer transit for a variety of reasons. The willingness attributes of this study, in addition to the high numbers of automobile, bicycle and parking pass ownership rates, indicate that the majority of millennial respondents are choice riders, who indicate a preference towards transit, but are more difficult to persuade toward transit use than other types of riders. In *The Link Between Environmental Attitudes and Behaviour* by Hini et. al., the authors discuss the weak correlation between attitudes and behaviors, and that marketing

towards these attitudes is a poor strategy. Instead, the authors argue, marketing should focus on what people actually do, and look at the probability of those choices recurring. As such, policy should increase attention on the conditions under which millennials actually use transit, and improve the conditions under which they are willing to use transit, as this study indicates a strong willingness does exist. An important consideration includes increasing the accessibility of public transit to users by adding transit stops, easing the ability to make route transfers, and marketing to millennials in ways that align with their ideals of social, environmental, and cultural capital. In fact, the spring 2015 survey study indicated a desire for a bus stop in the university's commercial district, which would have increased the percentage of students within one mile of a transit stop. Had this stop been implemented, spring 2016 survey results may have shown an increase in transit ridership. Secondly, study results indicate that marketing towards the youngest of millennials may be more affective in prompting transit use. Habits are often cultivated when young, becoming more difficult to change through age. Incentivizing transit use for young millennials through provision of free service or other similar discounts, may serve to catch this impressionable generation during an important time period. In the end, convenience should be the goal of policy makers and transit service providers, as even those with strong ecological or related ideals may not make a shift to transit use if not perceived as the most convenient option.

### **5.1.2 Conclusion**

Overall, the modal intervention was only met with moderate success, but provides an understanding of the differences between perceptions and reality as related to transportation. When it comes to increasing transit ridership, or that of other sustainable modes, public perceptions shape reality and have little to do with one's willingness. Willingness aligns better with values (shown by a high willingness to take public transit and high New Ecological Paradigm responses), which in turn, has weak correlation with behaviors (as seen through the high percentage of drive alone behaviors). In this study, millennials' perceived inconveniences were measured by travel time, travel distances, and distances to transit stops. These perceptions did not always correlate with reality, but did drive the strong tendency to use personal vehicles. The highly uncertain trajectory of millennial travel behaviors due to differing lifestyles, attitudes, and



preferences (McDonald, 2015), and the overall need for different modal interventions for different groups of people (Krizek, & El-Geneidy, 2007), demonstrate that cities should take advantage of the modal shift opportunities present within their communities – those that result from road closures, construction detours, changing work locations and the like. Taking advantage of these shocks to the transportation network present opportunities to minimize the attitude/behavior split through modal interventions in ways that align travel behaviors with sustainable alternative modes. Over time, such interventions may produce a new habit within travelers. Failure to recognize these opportunities decreases a city’s future ability to develop infrastructure systems that align with unique and diverse populations, like that of the millennial generation.

### **5.1.3 Future Research Opportunities**

As the millennial generation continues to age and diversify, there are several opportunities to continue to analyze the transit behaviors associated with this group of individuals. While the study engages millennials in a concentrated setting under limited conditions, a better understanding of this age cohort may be seen under the normalized conditions of a city-wide transit system. This study also does not account for gender differences of millennial transit users, nor those outside an academic setting.



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# APPENDIX B | GLOSSARY

**Access:** the ability to complete some desired personal or economic transaction (Walker, 2012)

**Baby-boomer:** individuals born in the United States between mid-1946 and mid-1964 (Colby & Ortman, 2014)

**Captive Rider:** rely mainly on transit as their main mode of transportation (Krizeck & Geneidy, 2007)

**Carsharing:** a form of short-term car rental that is essential in cities that want to encourage lower levels of car ownership, at least in their denser neighborhoods where the space requirements of private cars are hardest to meet. Carsharing eliminates the temptation to own a car that you only need once or twice a week, by providing the cheaper option of shared cars for these purposes (Walker, 2012)

**Choice Rider:** riders with alternative modes to use to reach varied destinations, yet for certain purposes, they prefer to use transit (Krizeck & Geneidy, 2007)

**Federal Transit Administration:** an agency within the United States Department of Transportation that provides financial and technical assistance to local public transit systems (FTA, 2015)

**Millennial:** an individual born between years 1983 and 2000 (Frontier Group, 2013)

**Passenger Mile:** One passenger carried for 1 mile (Walker, 2012)

**Personal Mobility:** the freedom to move (Walker, 2012)

**Public-Private-Partnership:** a contractual arrangement between a public agency (federal, state or local) and a private sector entity. Through this agreement, the skills and assets of each sector (public and private) are shared in delivering a service or facility for the use of the general public (7 Keys to Success, n.d.)

**Public Transit:** consists of regularly scheduled vehicle trips, open to all paying passengers, with the capacity to carry multiple passengers whose trips may have different origins, destinations and purposes (Walker, 2012)

**Transit Oriented Development:** development around transit seeking the desired outcomes of successful development, growing transit ridership, and livable communities (Dunphy et. al, 2003)

# APPENDIX C | SURVEY

## Section 1

Welcome to the APDesign Transportation Survey!

Before you get started, we'll need to have your consent to proceed. Click next to go there...

## Consent

### Title:

Investigating Transportation and Studio Patterns of APDesign Students

### Principal Investigator:

Dr. Brent Chamberlain (Primary Investigator and Contact), Assistant Professor, Landscape Architecture and Regional & Community Planning, Kansas State University, [brentchamberlain@ksu.edu](mailto:brentchamberlain@ksu.edu), (785) 532-5781.

### With collaborators:

Greg Newmark, Assistant Professor, Landscape Architecture/Regional & Community Planning, Kansas State University

Matthew Sanderson, Associate Professor, Sociology, Anthropology and Social Work, Kansas State University

Jessica Weber, Regional & Community Planning Graduate Student

### Purpose Statement:

The purpose of this research study is to better understand APDesign students' current transportation and studio patterns in order to ascertain transportation needs for the temporary relocation of APDesign during the rebuilding of Seaton Hall. This survey is intended for research and for use by university and municipal administrative planning organizations. The intent is to better understand the impacts of the move on students so that appropriate transportation services can be developed.

### Study Procedure:

You will be asked to provide responses to several questions about transportation preferences, your day-to-day travels and activities, your studio behavior and related patterns. This survey is expected to take 10-15 minutes to complete.

### Incentive:

If you complete this survey you will be given the option to enter your email address for a chance to win one of 25 *K-State Union Cards valued at \$10*. Your registration will remain confidential.

### Confidentiality:

The information that you provide in this experiment will be anonymous. The data will be stored online during the duration of this study and no longer than December 2016. Beyond that time the information will be stored by Dr. Brent Chamberlain and Dr. Greg Newmark for at least 5 years.

### Contact Information:

If you have any questions or concerns about this research project, you may contact Dr. Brent Chamberlain. If you have any concerns or complaints about your rights as a research participant and/or your experiences while participating in this study, you may contact the Kansas State University Research Compliance Office:

203 Fairchild Hall  
Manhattan KS, 66502  
785-532-3224  
[comply@k-state.edu](mailto:comply@k-state.edu)

### Consent:

Your participation in this study is entirely voluntary and you may refuse to participate or withdraw from the study at any time.

## Section I

In this section we would like to better understand your current circumstances and habits as they relate to transportation.

What degree program are you currently enrolled in?

What is your secondary degree program, if applicable?

Current year in the program?

Which of these modes of transportation do you own or have readily available in Manhattan?

- Automobile
- Bicycle
- Skateboard/kick scooter (human powered)
- Electric scooter/moped/bike
- Gas motorcycle/moped
- Hands free segway board/self balance scooter (battery powered)
- Other

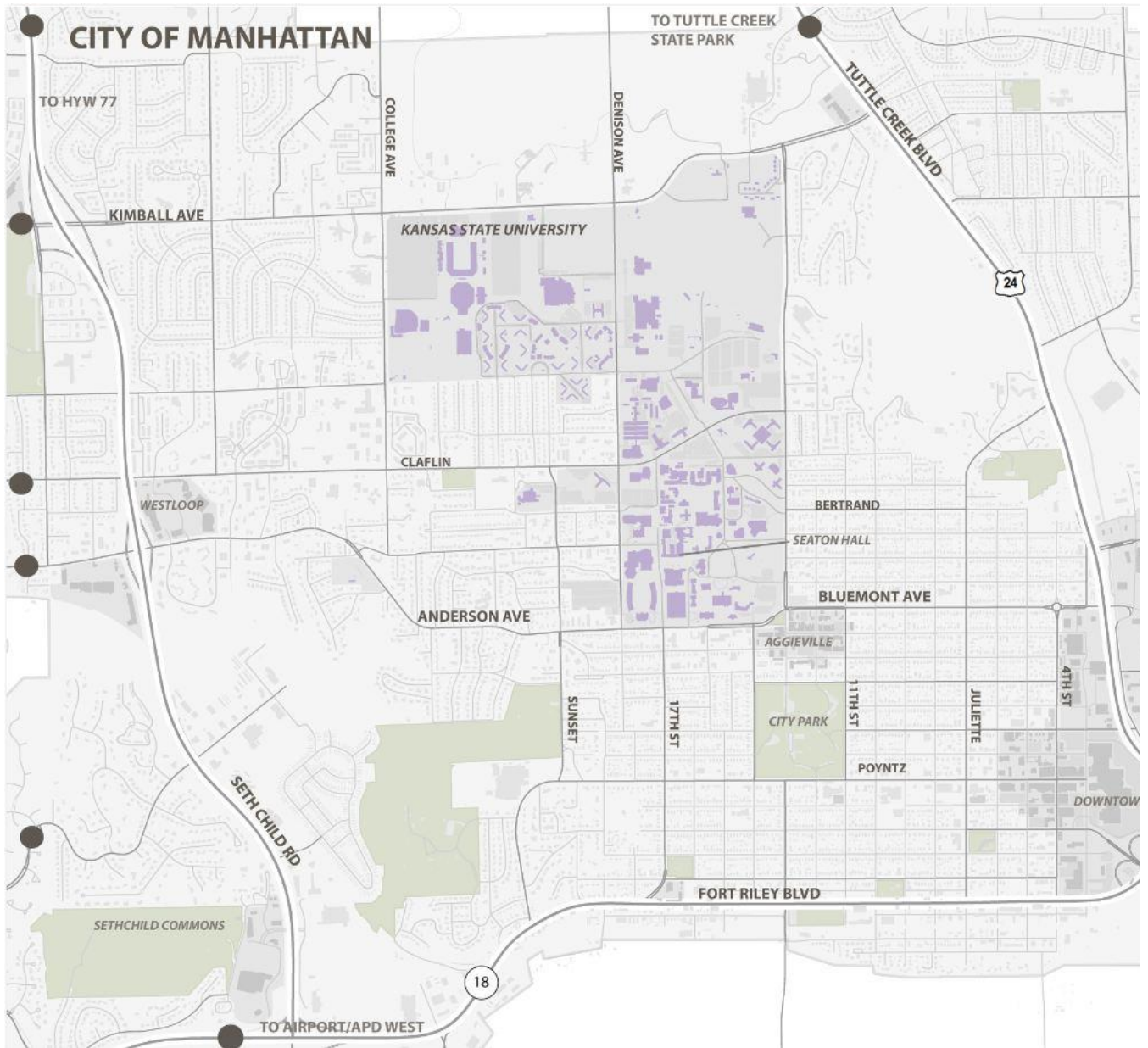
To what extent do you use the following modes of transportation to travel to/from APD West campus.

	Never	Always
Drive alone		
Carpool (as driver)		
Carpool (as passenger)		
Public Transportation		
Other <input style="width: 100px; height: 15px;" type="text"/>		

## Section II

In this section we would like to understand your transportation patterns on a typical week day in Manhattan. Please use the map of the City of Manhattan and its surrounding area to answer the following questions.

Please use the map below to identify your primary place of residence during the academic year by clicking the location on the map. If you live outside the city, click on one of the large gray dots nearest to your point of entry into the map area. For instance, if you live near the airport, you would click on the bottom left of the map along K-18.



## Section II Part 1

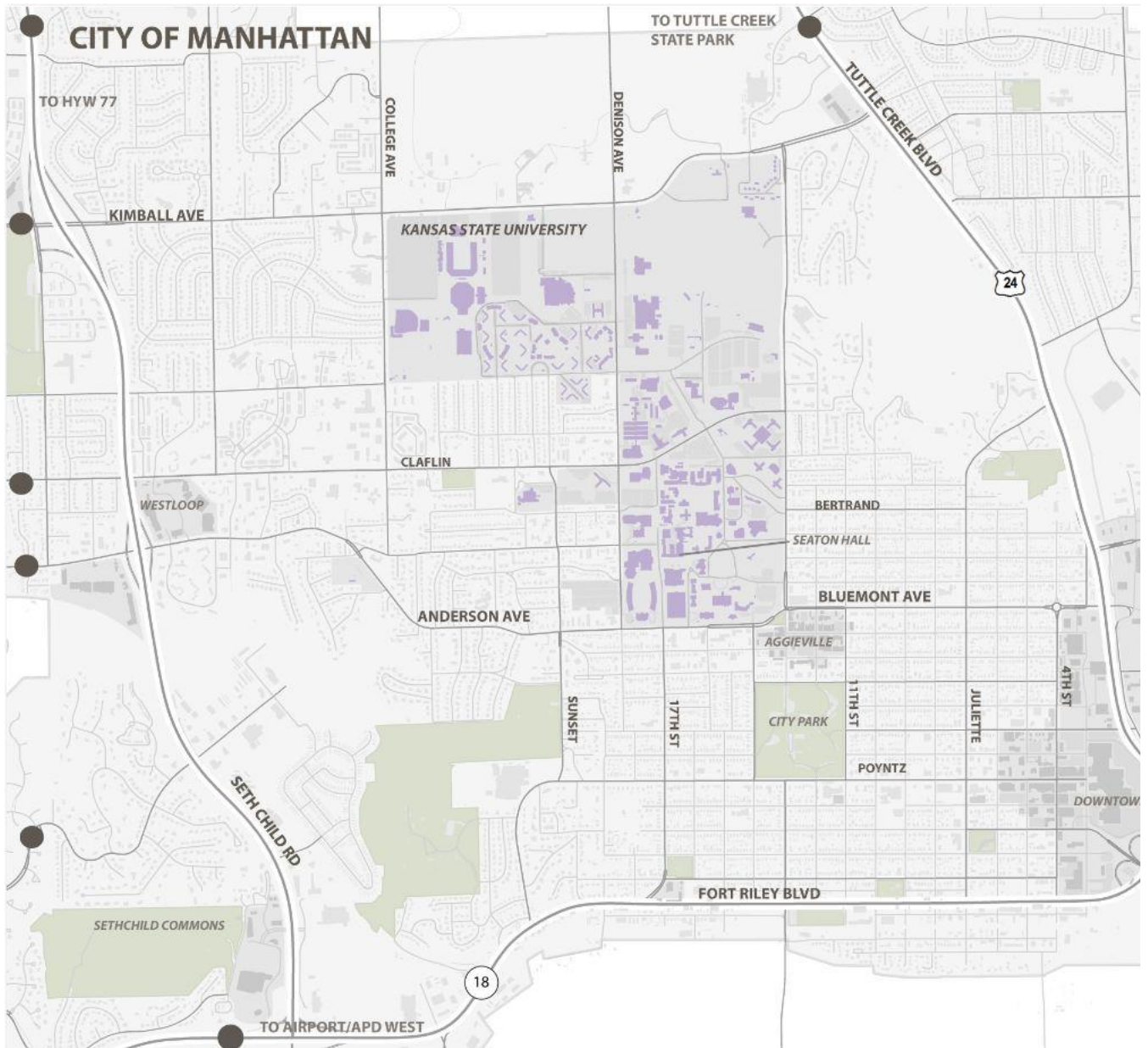
We are interested in your travel behaviors from last Wednesday. The following series of questions will ask where you were at, your mode of travel, and your activities at each location for last Wednesday.

On the next page, locate where you started your day...

Wed01

Where were you at 5 a.m.?

*If you are beyond the map area, we have placed dots on the main routes along the outside edge of the map. Click on the dot that identifies the route to leave/enter town.*



Do you leave this place at all during the next 24 hours?

- Yes
- No

What time do you leave your location?

Hour

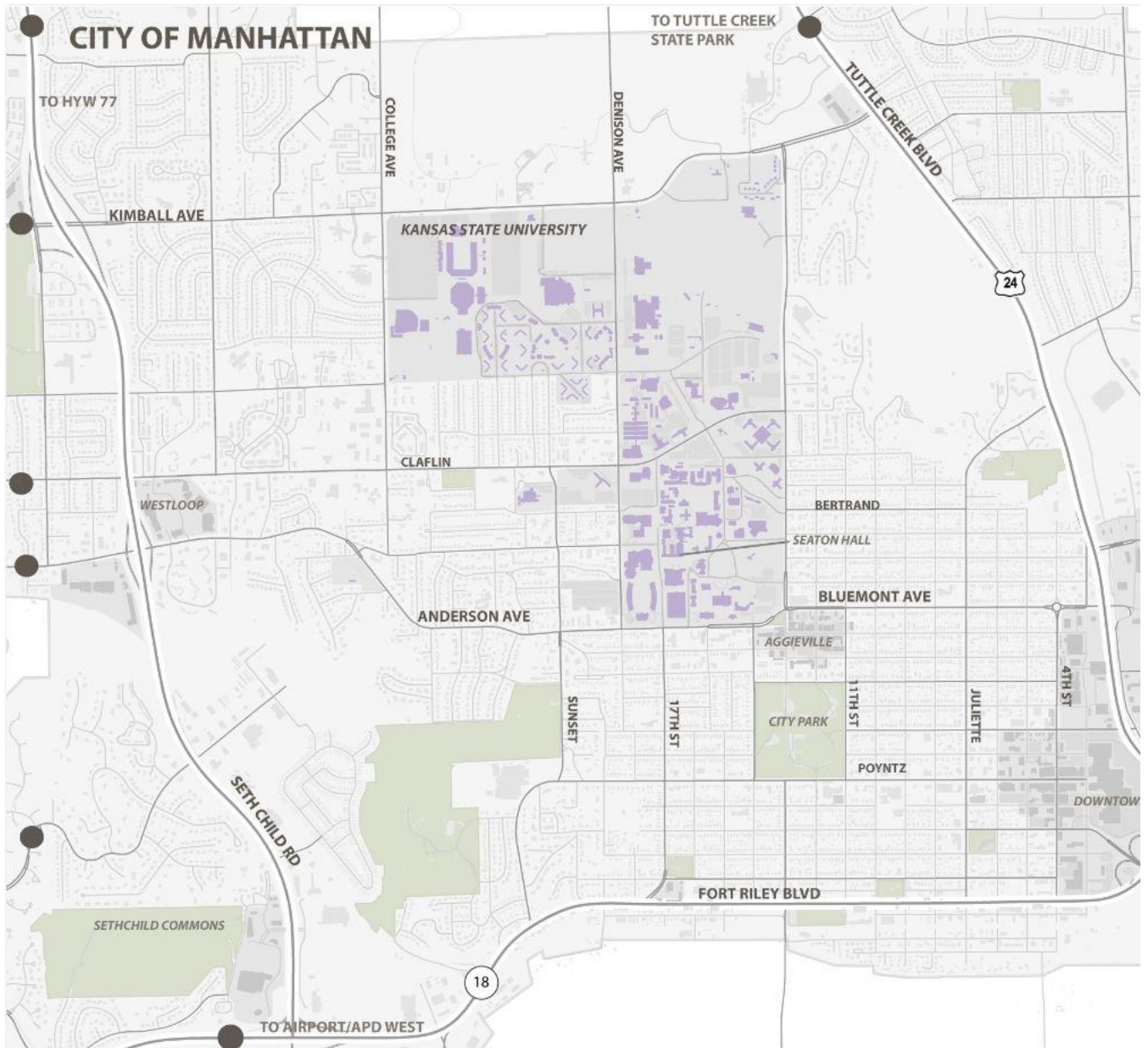
Minute

Morning (a.m.) or afternoon (p.m.)

Where do you go next?

*If you are entering or leaving the map area, we have placed dots on the main routes along the outside edge of the map. Click on the dot that identifies you would take to leave/enter town.*





**How do you get there?**

- Drive alone
- Carpool (as driver)
- Carpool (as passenger)
- Public transportation
- Walk
- Bicycle
- Skateboard/kick scooter (human powered)
- Electric bike/moped/scooter
- Gas motorcycle/moped
- Hands free segway/self balance scooter (battery powered)
- Other

**What is the total number of people in the vehicle (including yourself)?**



**What time did you arrive?**

Hour   
Minute   
Morning (a.m.) or afternoon (p.m.)

**What are you doing at this destination (check all that apply)?**

- Work (paid/volunteer)
- Scheduled studio or class
- Personal study/studio
- Eating
- Recreating
- Religious activity
- Social activity
- Other

**Wed02**

**Do you go anywhere else this day?**

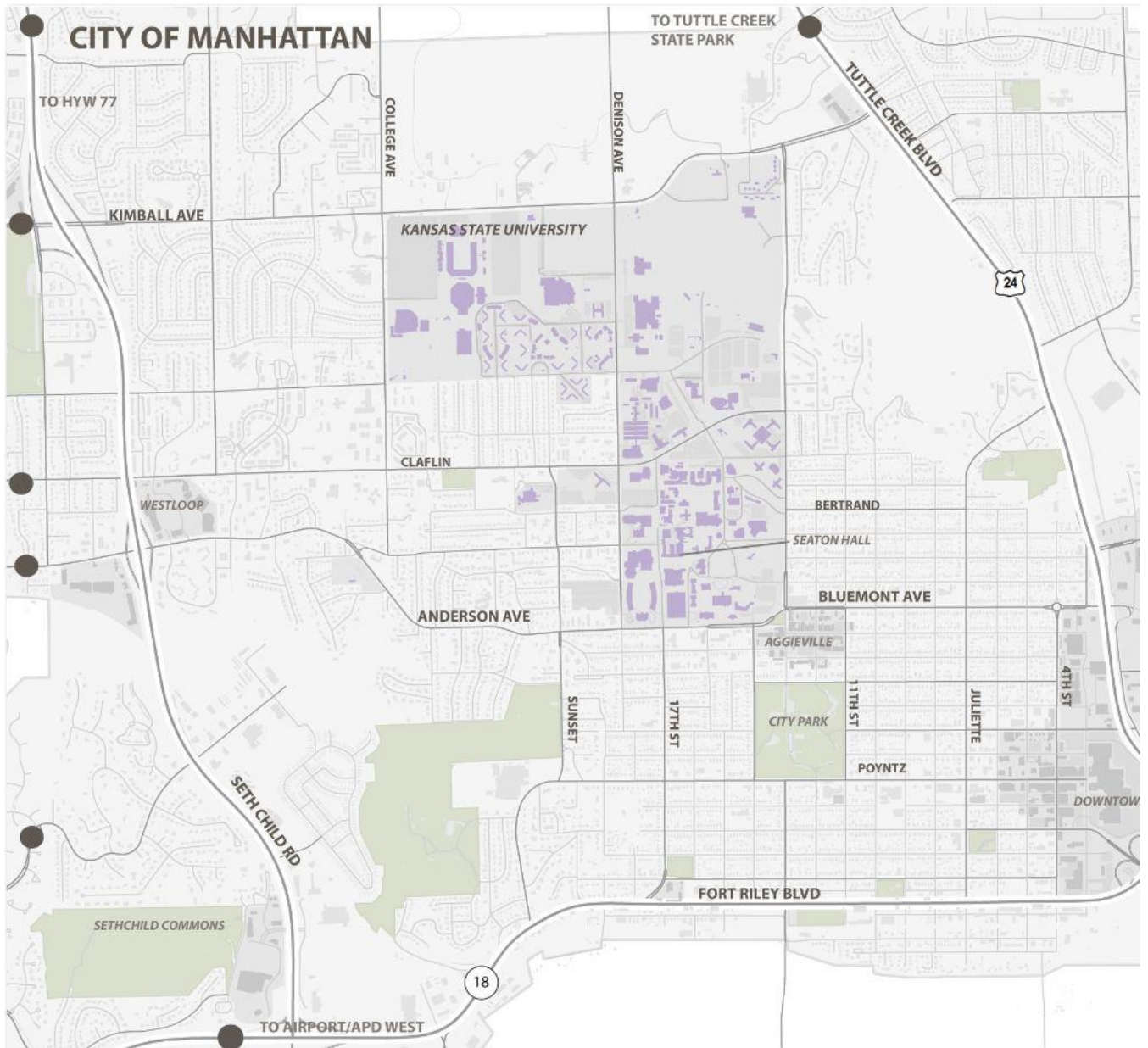
- Yes
- No

**What time do you leave your location?**

Hour   
Minute   
Morning (a.m.) or afternoon (p.m.)

**Where do you go next?**

*If you are entering or leaving the map area, we have placed dots on the main routes along the outside edge of the map. Click on the dot that identifies you would take to leave/enter town.*



**How do you get there?**

- Drive alone
- Carpool (as driver)
- Carpool (as passenger)
- Public transportation
- Walk
- Bicycle
- Skateboard/kick scooter (human powered)
- Electric bike/moped/scooter
- Gas motorcycle/moped
- Hands free segway/self balance scooter (battery powered)
- Other

**What is the total number of people in the vehicle (including yourself)?**

**What time did you arrive?**

Hour   
Minute   
Morning (a.m.) or afternoon (p.m.)

**What are you doing at this destination (check all that apply)?**

- Work (paid/volunteer)
- Scheduled studio or class
- Personal study/studio
- Eating
- Recreating
- Religious activity
- Social activity
- Other

**Wed03**

**Do you go anywhere else this day?**

- Yes
- No

**What time do you leave your location?**

Hour   
Minute   
Morning (a.m.) or afternoon (p.m.)

**Where do you go next?**

*If you are entering or leaving the map area, we have placed dots on the main routes along the outside edge of the map. Click on the dot that identifies you would take to leave/enter town.*

**What time did you arrive?**

Hour   
Minute   
Morning (a.m.) or afternoon (p.m.)

**What are you doing at this destination (check all that apply)?**

- Work (paid/volunteer)
- Scheduled studio or class
- Personal study/studio
- Eating
- Recreating
- Religious activity
- Social activity
- Other

**Section II Part 2**

**Section II Part 2**

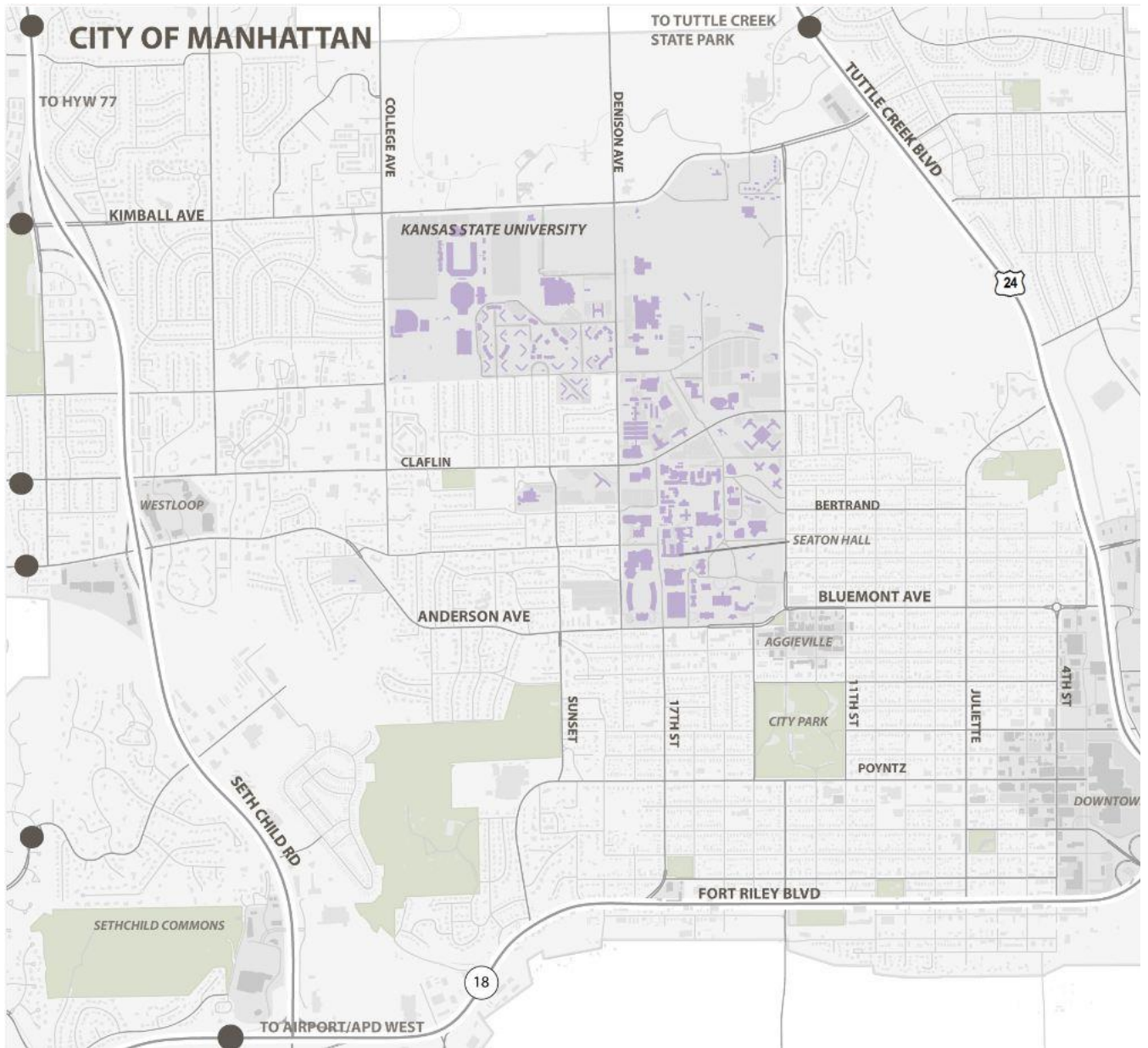
We are interested in your travel behaviors from last Thursday. The following series of questions will ask where you were at, your mode of travel, and your activities at each location.

We ask about both Wednesday and Thursday to understand a variety of daily habits.

**Thurs01**

**Where were you at 5 a.m.?**

*If you are beyond the map area, we have placed dots on the main routes along the outside edge of the map. Click on the dot that identifies the route take to leave/enter town.*



Did you leave this place at all during the next 24 hours?

- Yes
- No

What time do you leave your location?

Hour

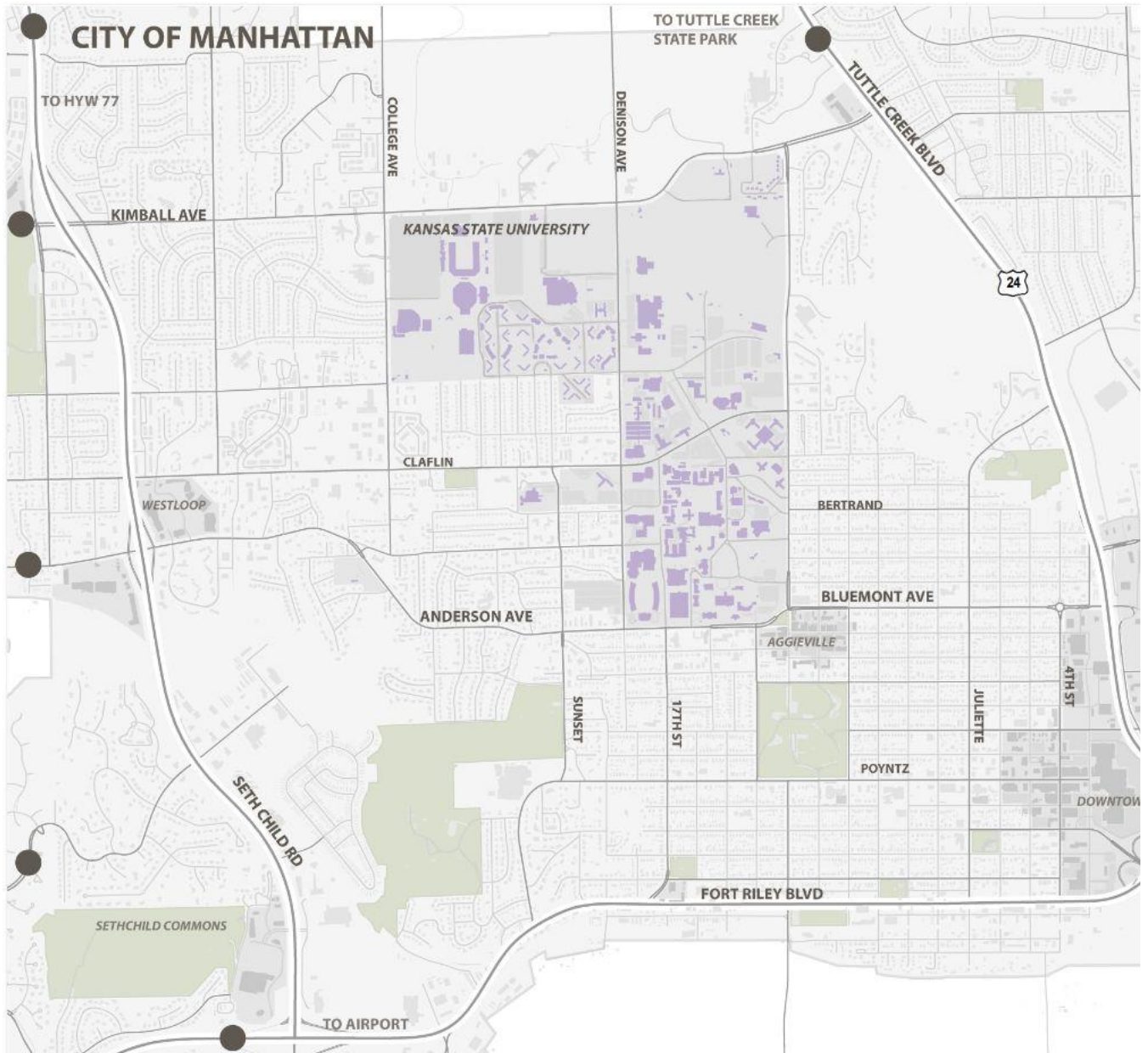
Minute

Morning (a.m.) or afternoon (p.m.)

Where are you going next?

*If you are entering or leaving the map area, we have placed dots on the main routes along the outside edge of the map. Click on the dot that identifies you would take to leave/enter town.*





**How do you get there?**

- Drive alone
- Carpool (as driver)
- Carpool (as passenger)
- Public transportation
- Walk
- Bicycle
- Skateboard/kick scooter (human powered)
- Electric bike/moped/scooter
- Gas motorcycle/moped
- Hands free segway/self balance scooter (battery powered)
- Other

**What is the total number of people in the vehicle (including yourself)?**

**What time did you arrive?**

Hour   
Minute   
Morning (a.m.) or afternoon (p.m.)

**What are you doing at this destination (check all that apply)?**

- Work (paid/volunteer)
- Scheduled studio or class
- Personal study/studio
- Eating
- Recreating
- Religious activity
- Social activity
- Other

**Thurs02**

**Do you go anywhere else this day?**

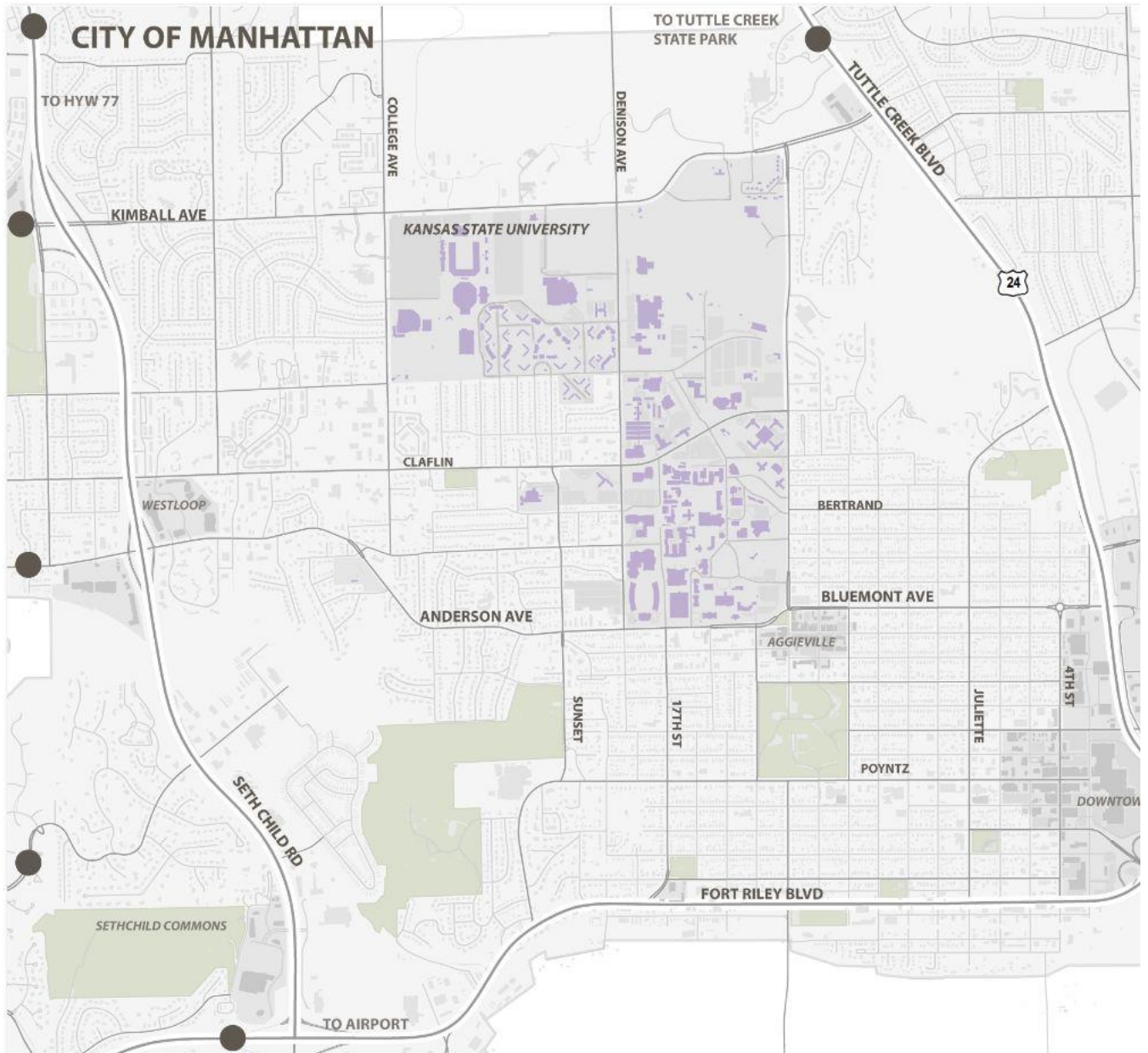
- Yes
- No

**What time do you leave your location?**

Hour   
Minute   
Morning (a.m.) or afternoon (p.m.)

**Where are you going next?**

*If you are entering or leaving the map area, we have placed dots on the main routes along the outside edge of the map. Click on the dot that identifies you would take to leave/enter town.*



**How do you get there?**

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- Hands free segway/self balance scooter (battery powered)
- Other

**What is the total number of people in the vehicle (including yourself)?**



**What time did you arrive?**

Hour   
Minute   
Morning (a.m.) or Afternoon (p.m.)

**What are you doing at this destination (check all that apply)?**

- Work (paid/volunteer)
- Scheduled studio or class
- Personal study/studio
- Eating
- Recreating
- Religious activity
- Social activity
- Other

**Thurs03**

**Do you go anywhere else this day?**

- Yes
- No

**What time do you leave your location?**

Hour   
Minute   
Morning (a.m.) or afternoon (p.m.)

**Where are you going next?**

*If you are entering or leaving the map area, we have placed dots on the main routes along the outside edge of the map. Click on the dot that identifies you would take to leave/enter town.*

**What time did you arrive?**

Hour   
Minute   
Morning (a.m.) or Afternoon (p.m.)

**What are you doing at this destination (check all that apply)?**

- Work (paid/volunteer)
- Scheduled studio or class
- Personal study/studio
- Eating
- Recreating
- Religious activity
- Social activity
- Other

**Section III**

**Section III**

This section of the survey asks about your public transportation experiences.

**Do you have a KSU parking pass?**

**How many round trips per week do you make to and from APD West?  
(to APD West and back to Manhattan is one trip)**



**How many of these trips are traveled via the APD West shuttle?**

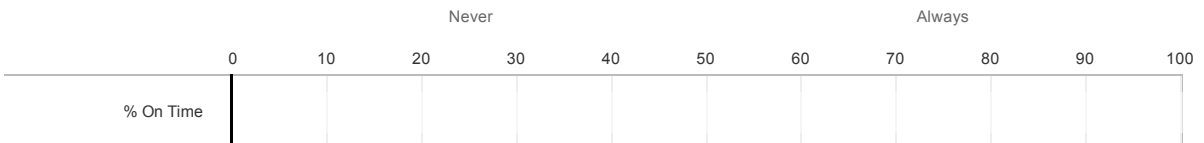
**Are you aware of an aTa Bus stop near where you live?**

- Yes
- No

**Have you ever used aTa Bus aside from the APD West shuttle?**

- Yes
- No

**What percentage do you think the APD West Shuttle leaves on time (within 5 minutes of scheduled time)?**



How would you change the APD West shuttle to be better for you?

Did you have any regular experience using public transit prior to attending K-State?

- Yes
- No

Section IV

**Section IV**

This section asks about your perspectives on the environment.

I am concerned about the environment because of (check all that apply):

- My health
- My lifestyle
- Food and water sources
- The beauty of the natural world
- Animal habitat
- Needs of future generations
- I am not concerned about environmental problems
- Other

Please respond to the following statements:

	Level of Agreement				
	Strongly Agree	Agree	Unsure	Disagree	Strongly Disagree
We are approaching the limit of the number of people the Earth can support.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Humans have the right to modify the natural environment to suit their needs.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When humans interfere with nature it often produces disastrous consequences.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Human ingenuity will insure that we do not make the Earth unlivable.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Humans are seriously abusing the environment.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The Earth has plenty of natural resources if we just learn how to develop them.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Plants and animals have as much right as humans to exist.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The balance of nature is strong enough to cope with the impacts of modern industrial nations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Despite our special abilities, humans are still subject to the laws of nature.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The so-called "ecological crisis" facing humankind has been greatly exaggerated.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The Earth is like a spaceship with very limited room and resources.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Humans were meant to rule over the rest of nature.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The balance of nature is very delicate and easily upset.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Humans will eventually learn enough about how nature works to be able to control it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If things continue on their present course, we will soon experience a major ecological catastrophe.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Did you take the *APDesign Transportation* survey conducted in the spring of 2015?

- Yes
- No

Can we contact you in the future for the purpose of related studies?

- Yes
- No

We are interested in collecting longitudinal data, which is long-term data collected over time.

Please answer the two questions below in order to create a unique and anonymous survey ID for the purpose of comparing your anonymous survey responses with those of future studies.

What is your father's middle name?

In what month is your mother's birthday?

We invite you to provide any additional comments as they pertain to the purpose of this survey.

## Thank you for completing the survey!

Through understanding your current habits and needs, you have the potential to impact transportation planning decisions!

A reminder that all information provided is and will remain anonymous. Upon completion of the 2015 term, the Primary Investigator will maintain the data for at least 5 years. Should you have any questions or concerns related to the survey or research project please contact:

Primary Investigator: Dr. Brent Chamberlain ([brentchamberlain@ksu.edu](mailto:brentchamberlain@ksu.edu))

Collaborators on the project include Greg Newmark, Matthew Sanderson, and Jessica Weber.

Again, thank you for your participation!

Sincerely  
Brent Chamberlain, Ph.D.S  
Assistant Professor  
Landscape Architecture and Regional & Community Planning  
Kansas State University

**Check out aTa Bus's Twitter and Facebook accounts for real-time updates on transit service!**

**[#flinthillsatabus](#)**  
**[www.facebook.com/FlintHillsATABus/](http://www.facebook.com/FlintHillsATABus/)**