**Title and Subtitle**
Evaluating Bicycling Commuter Experiences at Texas A&M University and Adjacent Areas in the City of College Station, Texas

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**Abstract**
The university-oriented community of College Station, Texas offers a great opportunity for bicycle commuting. Both the City of College Station and Texas A&M University (TAMU) have taken steps to add facilities for pedestrians and bicycles in and around campus areas. The goal of this project was to assess existing conditions to determine the potential to further increase bicycle use in the community. We focused our research on the TAMU campus and adjacent areas, as the university is the largest trip generator in this community.

Two surveys of bicycle commuters were conducted in which bicycle commuters reported inadequate pathways (including poor pavement conditions as well as too few pathways), aggressive motorists, and difficult intersections/traffic signals as their major obstacles to bicycling to campus. Fifty-five percent of survey respondents would like to have more and/or better bicycle pathways. Comments indicated that separate, dedicated pathways would be preferred by bicyclists, and 69 percent of survey respondents said they would bicycle more if a safe and direct route was available.

The research team conducted a survey of non-bicycle commuters in which 42 percent of respondents, for reasons not related to the bicycling environment, said they could not be encouraged to bike. Fourteen percent said that improving pathways might encourage them to bicycle commute, and 5 percent stated that safety concerns are their primary reason for not bicycling to campus.

The researchers also conducted a manual count of commuter bicyclists and found that of the approximately 45,000 students enrolled at TAMU, 1,906 enter campus by bicycle on a typical class day. Available data confirmed that approximately 22,000 students enter campus daily through modes other than bicycle. Based on the information gathered in this research project, the researchers estimate that approximately 500 additional students may bike to campus daily if safe and direct routes to campus were available to them.

**Key Words**
Bicycle, Bicycle Commuting, Bicycle Count, Bicycle Survey, University Bicycle

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EVALUATING BICYCLING COMMUTER EXPERIENCES AT TEXAS A&M UNIVERSITY AND ADJACENT AREAS IN THE CITY OF COLLEGE STATION, TEXAS

by

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ABSTRACT

The university-oriented community of College Station, Texas offers a great opportunity for bicycle commuting. Both the City of College Station and Texas A&M University (TAMU) have taken steps to add facilities for pedestrians and bicycles in and around campus areas. The goal of this project was to assess existing conditions to determine the potential to further increase bicycle use in the community. We focused our research on the TAMU campus and adjacent areas, as the university is the largest trip generator in this community.

Two surveys of bicycle commuters were conducted in which bicycle commuters reported inadequate pathways (including poor pavement conditions as well as too few pathways), aggressive motorists, and difficult intersections/traffic signals as their major obstacles to bicycling to campus. Fifty-five percent of survey respondents would like to have more and/or better bicycle pathways. Comments indicated that separate, dedicated pathways would be preferred by bicyclists, and 69 percent of survey respondents said they would bicycle more if a safe and direct route was available.

The research team conducted a survey of non-bicycle commuters in which 42 percent of respondents, for reasons not related to the bicycling environment, said they could not be encouraged to bike. Fourteen percent said that improving pathways might encourage them to bicycle commute, and 5 percent stated that safety concerns are their primary reason for not bicycling to campus.

The researchers also conducted a manual count of commuter bicyclists and found that of the approximately 45,000 students enrolled at TAMU, 1,906 enter campus by bicycle on a typical class day. Available data confirmed that approximately 22,000 students enter campus daily through modes other than bicycle. Based on the information gathered in this research project, the researchers estimate that approximately 500 additional students may bike to campus daily if safe and direct routes to campus were available to them.
EXECUTIVE SUMMARY

Local streets are often designed to accommodate only vehicles – without consideration for pedestrians and bicyclists. The City of College Station has created a bicycle master plan that, when completed, will connect all parts of the city with dedicated bicycle paths. This plan was developed, in part, on recommendations from a 1975 study conducted by the Brazos Valley League of Women Voters. The city is also currently working with the Texas A&M University Bicycle Task Force to coordinate bicycle programs into a cohesive and well-connected system.

For this project, surveys of bicyclists were conducted to assess experiences and to determine what problems exist and where. Additionally, an observational count was conducted to help evaluate bicycle volumes and routes.

The goal of this project was to determine the potential to increase bicycle use in the community. The objectives to achieve this goal were to:

1) Determine how many people currently ride a bike to campus on a typical class day.
2) Learn which routes bicyclists use to travel to campus to discover areas of interest.
3) Ascertain what problems bicyclists encounter along their commute.
4) Determine what aspects (physical barriers, behavioral issues, other) on the bicyclists’ route affect comfort level and which facilities contribute to a perception of safety or hazard.
5) Research the above to solve the hypothesis that bicycle activity would increase if bicycling were made safer.
6) Determine what changes might promote bicycle commuting among current nonriders.

The first survey conducted for this project revealed that the southwest side of the Texas A&M University (TAMU) campus had the highest rate of complaints at 2.29 per respondent, but this was not significantly different from the southeast and the north sides of campus (2.25 and 2.16 complaints per respondent, respectively). The east side of campus had the lowest rate of complaints, less than one (0.9) complaint per respondent.

More than half of respondents on the southwest side of campus indicated a problem with difficult intersections. The south and east sides of campus had similar rates of complaints; and respondents specifically reported too few bicycles routes as a common problem. On the east side of campus, the highest number of complaints referenced poor lighting, and on the north side of campus, poorly maintained bicycle paths and poor lighting were the most frequently reported problems.

The TAMU bicycle-commuter count was conducted manually by posting counters at 12 campus entrances, including parking lots that were likely to be used as entrances and shortcuts. A total of 1,908 bikes were counted entering campus, and 1,543 bikes were counted leaving campus during this count. These numbers were added for a total of 3,451 campus commuter bicycle trips. It is clear from the data collected that the high-density residential areas (southwest and north sides of campus) and/or high-density restaurant and trade areas (north side) have the highest levels of bicycle traffic.
A second survey was conducted on Bike to Work Day. Survey staff interviewed bicyclists and obtained a total of 74 completed questionnaires. The second questionnaire differed from the first in that the first questionnaire was oriented toward commuting habits and the second questionnaire was designed to identify problems and preferences. The main problem (encountered by 37 percent of respondents) in “bike commuting to and from campus” was identified as inadequate pathways. A total of 23 percent of the respondents reported that dealing with drivers was their biggest commuting problem, and 16 percent said they have no problems along their commute. A total of 37 percent of this group of commuter bicyclists reported that pedestrians are the major obstacle to bicyclists commuting on campus, and 12 percent responded that on-campus pathways are inadequate.

The researchers asked bike commuters about safer bike routes, and a majority (69 percent) of survey respondents replied they would travel (an average of 1.1 miles) out of their way to use safer bikeways, whereas 30 percent answered they would not. When asked what single step the cities or the university could take to improve bicycling, a statistically significant majority (55 percent) of responses pertained to improving the quality and/or quantity of bicycle paths. The second most common (12 percent) answer was improving education and awareness among bicyclists, pedestrians, and motorists to reduce conflict and improve safety.

To satisfy the objective of determining what changes might promote bicycle commuting among current nonriders, a third survey was conducted. The survey found that reasons for not bicycle commuting include not having a bike available (34 percent), living too far from campus (24 percent), not liking the weather (9 percent), and feeling that bike riding in the community is too dangerous (5 percent). When asked what changes the university or the cities could make to encourage bicycle commuting, 42 percent of respondents said that nothing can be done to convince them to ride a bicycle to campus but 26 percent of the respondents said that improving bicycle pathways or adding bicycle pathways might encourage them to ride.

The reasons for promoting bicycling in lieu of driving are many. These include improving physical health, reducing the incidence of obesity, and lessening the negative effects of motorized vehicle use, to conserving energy and natural resources. This research project discovered that the reasons for not bicycling are also numerous and include not having access to a bicycle, not wanting to bicycle in inclement weather, not feeling safe bicycling with vehicle traffic, and matters of convenience.

Changes in policy and additions to both bike and pedestrian facilities may affect an individual’s decision to walk or ride a bicycle. This research project led us to the conclusion that the single most important step that the city or university could take to increase bicycle commuting would be to add and improve bicycle paths, and that doing so may encourage another 500 students to bicycle commute to campus.
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CHAPTER 1: INTRODUCTION

BACKGROUND

In 1975, the Brazos Valley League of Women Voters (BVLWV) conducted a bicycle survey of the Texas A&M University (TAMU) campus and adjacent areas in the City of College Station. The researchers conducted their survey at that time because of a perception of hazardous conditions for commuting bicyclists. Based upon the results of the 1975 survey, the BVLWV prepared a report outlining areas of difficulty for bicycle riders and made recommendations for modifications of some streets and intersections to improve safety for bicyclists. The City of College Station has since created a bicycle master plan that, when completed, will connect all parts of the city with dedicated bicycle paths, bicycle lanes, and bicycle routes.

For this project, researchers reviewed the 1975 BVLWV survey and report. Researchers also conducted surveys of commuter bicyclists to assess the current conditions for bicyclists in the community and surveys of nonbicyclists to determine what might encourage them to ride.

The researchers also attempted to determine any achieved reduction in accidents resulting from the implemented changes; however, accident data from 1975, the year of the League of Women Voter’s survey, are not available.

Research Objectives

Project Goal: Determine the potential to increase bicycle use in the Bryan – College Station – Texas A&M University community.

Research Objective: Determine how many people currently bike to campus on a typical class day.

Research Objective: Learn which routes bicyclists use to travel to campus to discover areas of interest.

Research Objective: Ascertain issues encountered by bicyclists along their commute.

Research Objective: Determine what aspects (physical barriers, behavioral issues, other) on the bicyclists’ route affect comfort level and which facilities contribute to a perception of safety or hazard.

Research Objective: Research the above objective to solve the hypothesis that bicycle activity would increase if bicycling were made safer.

Research Objective: Determine what changes might promote bicycle commuting among current nonriders.
Literature Review

Unlike driving a vehicle, which is a well-established part of the average American’s travel patterns, bicycling is still, to many, a recreational pastime. Commutes by bicycle constitute a small portion of the total trips made in the United States. Prior research estimated that in the U.S. for the year between 1990 and 1991, bicyclists rode 9.3 to 34.3 billion km (5.8 to 21.3 billion miles), representing 0.28 to 1.03 percent of total vehicle miles traveled.¹

In 2005, reasons to change these patterns are abundant: pedestrians and bicyclists do not consume oil, cause smog or acid rain, pollute waterways, add to the risk of global climate change, create noise, or necessitate paving over more of the landscape for parking. Walking and bicycling are also good ways to get the exercise that many people need and want. In fact, according to the National Cancer Institute:

Results from the 1999–2000 National Health and Nutrition Examination Survey (NHANES) show that an estimated 64 percent of U.S. adults are either overweight or obese. In addition, the percentage of children who are overweight continues to increase. Among children and teens ages 6 to 19, 15 percent (almost 9 million) are overweight according to the 1999–2000 data, or triple what the proportion was in 1980.²

Researchers have found a strong correlation between lack of physical activity and obesity, and much of that has been attributed to our auto-oriented culture. More than one-quarter of the trips Americans take are no more than 1 mile long, a walkable distance, and almost one-half of trips are less than 3 miles long and are thus fit for bicycling.³ The Federal Highway Administration (FHWA) (1992) has set a goal of doubling Americans’ use of walking and bicycling as forms of transportation.⁴ So, how do people, in effect, “get there from here?” What can be done to increase nonmotorized travel for health, environmental, and financial benefit, when:

…[I]nsights from the public health and social marketing fields suggest that the decision to even consider riding a bicycle is a multi-staged process involving a variety of interacting personal, social, and environmental factors. The choice to bicycle for a particular trip depends not only on the specific characteristics of that trip but on the individual’s attitude toward and willingness to bicycle. While attitudinal research gives important insights into pedestrian and transit travel choices as well, its implications are perhaps most significant for bicycle travel (emphasis added).⁵

FHWA’s (Goldsmith, 1992) National Bicycle and Walking Study found that in addition to the many factors already described, family circumstances, personal habits, and topography also affect an individual’s decision to commute by bicycle.⁴ Moritz (1997) conducted a survey of 2,374 bicycle commuters in the U.S. and Canada. The survey includes data on socioeconomics and demographics, commuting habits and trip characteristics, accidents, equipment and facilities used, relative danger by type of street, and motivation.⁶
Changes in policy and additions to both bike and pedestrian facilities that may affect an individual’s decision to walk or ride a bicycle are occurring around the country. New standards include more bike lanes and sidewalks, decreased intersection crossing distances, and improved pedestrian signal technology, such as count-down signals and audible pedestrian crossing tones. Title 23 of the United States Code, Section 217, provides the funding mechanisms, planning requirements, and policy tools needed to design walkable and bicycle-friendly communities. The legislation also calls for the integration of bicycling and walking into conventional transportation systems to enhance the ability of communities to improve the safety and practicality of bicycling and walking for everyday travel.

Determining bicycle commuter ridership for this study may help support the goals of the City of College Station’s *Bikeway and Pedestrian Master Plan Update 2002* in context of the city’s *Comprehensive Plan*:

Objective 5.5: College Station should continue to provide *bikeways between residential areas, parks, schools, Texas A&M University, and retail/employment centers.*

Texas A&M University’s vision in its Campus Master Plan 2004 firmly establishes its goal of increased nonmotorized commutes to campus:

The University should seek the city’s support to strengthen the notion of George Bush Drive and Texas Avenue as true avenues, incorporating street trees along the edges and in the median, and should support city efforts to utilize both as bicycle routes (off-street bicycle paths).

Researchers have confirmed that even small improvements to bicycle facilities can initiate usage:

Higher levels of bicycle infrastructure are positively and significantly correlated with higher rates of bicycle commuting.

This analysis confirms the hunches of public policy makers that at least some, but perhaps not an inconsequential number, of commuters will be responsive to the bicycling option if only it were made available.

The easiest policy initiative to encourage bicycle commuting is the installation of bicycle parking facilities at employment centers.

In summary, there are compelling reasons for focusing bicycle-related research and policies on commuter trips, whether to campus or the office, and they are the motivation for the research presented in this report.
Selection of Bicycle Programs Established on Other College Campuses

University of Texas (UT) – Austin
Each day more than 1,000 individuals use bicycles as their mode of transportation to, from, and/or around the UT campus. Bicycle registration is required for everyone who bikes on campus, and the administration uses registration to quantify actual bicycles on campus.

- Registration is required of anyone riding on campus (including visitors) – sticker issued
- Dismount zones – 2 blocks of an east-west road is a designated pedestrian mall: no vehicles, bicycle dismount zone, marked with barriers and signs, eventually will have pavers
- No riding on sidewalks
- Lights required for night riding
- Impoundment and $50 fine for illegal parking
- Campus-wide 15 mph speed limit reduces pedestrian/bike/motor-vehicle conflicts
- UT works with City of Austin on bicycle plans, but often has different goals

University of Washington (UW) – Seattle
Bicycles are counted at racks located throughout campus.
- Registration is recommended
- Formal bicycle plan – “UW Bicycle Guide” brochure distributed
- Shower facilities are available for pedestrian/bike commuters at several locations on campus
- Discounted helmets and lights are available through health services
- Bicycle “Slow Zones” and dismount zones where cyclists must walk their bicycles between classes – marked by signs and pavement markings
- More bike lockers than any other campus (534), with waiting list ($55/yr rental)
- Bike rooms
- Impoundment for illegal parking and abandonment (30 days)
- “Bike buddies” commuter program
- All buses have bike racks
- Routes and lanes connected with city system

Arizona State University – Tempe
Bicycles counted in racks – estimate 15,000 trips to-and-from campus each day
- Registration recommended (through City of Tempe, $2.00 fee); the university would establish its own bicycle registry if it had the staff to do so
- 19,000 racks – most are used; usage is monitored and racks are moved as needed
- Had lockers, which were not used and so were removed
- High theft rate – suggests cyclists buy “clunkers” for use on campus

University of Florida – Gainesville
- Registration is recommended
- Bicycle lanes on busiest roads
- Campus police offer bicycle safety course for those ticketed for rules violations
• Transportation and Parking Advisory Committee works with university on the University Master Plan

**University of Colorado – Boulder**
Mandatory bicycle registration - $10.00 lifetime fee

**University of Michigan – Ann Arbor**
• No bike plan
• Bike lockers are available

**University of North Carolina – Chapel Hill**
• Registration is optional, but recommended
• Bike rooms are available in some buildings

**Ohio State University – Columbus**
• Campus Master Plan and city have integrated bike routes

**University of Wisconsin – Madison**
Currently developing Campus Master Plan, which will include bicycle system improvements
• Bike paths
• Bicycle lockers (35), reported to be in high demand

**Discussion Regarding Stated Preference vs. Revealed Preference Survey Types**

Surveys are a commonly used research tool for gathering information on preferences and levels of satisfaction. Attitudinal surveys are one measure to establish perceptions of bicycle commuting. The surveys prepared for this research project were designed to elicit potential changes in bicycle commuter behavior if facilities were improved or augmented.

Forecasting the demand for new products or transportation innovations requires information about consumers’ preferences for products or services that do not exist in the current marketplace. In general, “stated preference” (SP) surveys rely on what consumers say they will do in the future – “I will bicycle commute to/from campus if new bikes lanes are built.” “Revealed preference” (RP) surveys, however, operate under the notion that what people want is revealed by what they already do (commuting to/from campus by personal vehicle), not by what they say – the old adage that actions speak louder than words.

SP data has been subject to criticism by economists and other researchers because many times consumers react differently to hypothetical scenarios than they would if confronted by the same alternatives in a real situation. Additionally, during the survey, respondents have to be presented with much more information than they would have in making their travel decisions. Finally, bias can occur during stated preference data collection, including the following:

• affirmation bias: the respondent may adjust, consciously or not, his/her responses to what he/she thinks the interviewer expects to hear;
• rationalization bias: while trying to rationalize his/her current behavior, the respondent may provide artificial responses that do not reflect the way he/she actually acts;
• policy response bias: the respondent may try to influence, by his/her responses, decisions or policies which he/she believes will be based on the results; and
• unconstrained response bias: responses may be somewhat unrealistic because the respondent may omit actual constraints he/she experiences in reality.14

Despite these problems, however, there are a number of benefits to utilizing stated preference data.15 SP and RP data are seen to each have their own strengths and weaknesses, and surveys for this project included both stated preferences and observations (counts).

A variety of preference surveys have been conducted by states, metropolitan planning organizations (MPOs), and other organizations to capture commuter attitude and mode choice. Preference surveys can have a wide range of uses in bicycle and pedestrian planning, such as:

• estimating the potential mode choice impacts of a facility improvement or policy change;
• determining relative preferences for different types of improvements; and
• measuring attitudes and other personal variables which influence the decision to bicycle or walk.16

Beyond preference surveys, examining the factors that influence frequency of commuting to campus by bicycle is important for several reasons. The routine physical exercise provided by bicycle use has significant health benefits for the bicycling individual. Additionally, every bicycle trip made in lieu of a vehicle trip can help alleviate automobile-related problems such as traffic congestion, fuel use, and degradation of natural resources for roads and parking. In short, bicycle riding has positive impacts on both personal health and the environment.
CHAPTER 2: DATA AND COLLECTION METHODOLOGY

A significant challenge facing the analysis of bicycle and pedestrian modes is the lack of documentation on usage and demand, which makes it difficult to measure the cost/benefit of investments in these modes. The *Guidebook on Methods to Estimate Non-Motorized Travel* states that “further development of modeling techniques and data sources are needed to better integrate bicycle and pedestrian travel into mainstream transportation models and planning activities.”

In 2004, the *Development of the National Bicycle and Pedestrian Documentation Project* report was prepared to provide guidance to local agencies and organizations conducting bicycle and pedestrian counts and surveys a consistent, uniform methodology as a national standard.

Very little quantitative information exists in the literature concerning the frequency of bicycle commuter trips from the local community to a university campus. Complications arise when attempting to count bicycles and may be the reason for the dearth of information: bicycles are not easily detected by automatic counting devices and they travel in locations other than roadways (e.g., as the crow flies, even through green spaces). Indeed, only one study was identified that closely resembled the methodology utilized in this research project.

The *Bicycle Cordon Count Pilot Study* (Aultman-Hall, 1999) conducted a pilot study of bicycle count methodology at the University of Kentucky Lexington campus, considered the largest regular bicycle trip generator in Kentucky. Student counters were stationed around the campus perimeter, forming a complete cordon in shifts from 7 a.m. to 7 p.m. on Tuesday, September 22, 1998. Counters recorded the following data: time of observation, gender, approximate age, helmet usage, location of bicycle (road versus sidewalk), travel direction (inbound versus outbound), and travel direction (with or against traffic). There were 3,628 bicycle trips counted, among other findings.

DATA AND ANALYSIS

In conducting research for this TAMU/College Station bicycle commuter study, the survey staff interviewed (and counted) as many people as possible during the time periods established for administering each survey. As a result, each of the three survey events generated a different number of completed questionnaires. The researchers performed appropriate statistical significance tests because of the differences in the number of responses.

**Survey One: Bicycle Commuters**

The first of three surveys (Appendix A) conducted in the research project was to assess commuting habits and identify the type and location of problems encountered on the commute.

Prior to conducting the survey of commuter bicyclists, a 1-hour orientation was held for volunteers from the City of College Station, the Bryan/College Station Metropolitan Planning Organization (BCSMPO), Aggieland Bicycling Club, TAMU students, and the Texas Transportation Institute (TTI), in which interviewers were instructed to obtain responses from bicycle commuters only. Interviewers were given maps, clipboards with questionnaire forms, and
yellow T-shirts printed front and back with “Bicycle Study 2004-2005” and “Survey Staff” for identification.

On Tuesday, November 16, 2004, a crew of 15 interviewers approached bicyclists at the more heavily used bicycle racks on campus. Interview staff selected only those riders coming from off-campus locations, referred to here as “bicycle commuters.” A total of 144 questionnaires were completed. The first six questions were introductory. A total of 80 percent of these commuters reported bicycling to campus at least four times per week, 19 percent ride one to three times per week, and 1 percent ride less than once per week.

In addition, 88 percent of the respondents said they take the most direct route to campus, while 19 percent said they choose their route to avoid vehicle traffic. Seventeen percent of survey respondents that said they use a designated bicycle path as their route of choice, 96 percent always use the same path, and 4 percent vary their route.

On the survey form, the question “How often do you encounter the following obstacles on your trip route?” was followed by a table of potential obstacles. The data collected from this question were tabulated by frequency of response to each of a list of “problems” and is presented below in bar graph format as Figures 1a through 1g and also as Table 1. In tabulating these data, omitted responses were given their own category. The frequency categories “routinely,” “occasionally,” “rarely,” and “never” were not defined by the researchers; therefore, answers are based on the respondents’ interpretation of those categories.

![Figure 1a: Frequency of bike commuters encountering aggressive motorists.](image-url)
Figure 1b: Frequency of bike commuters encountering problem pedestrians.

Figure 1c: Frequency of bike commuters encountering debris in the bikeway.

Figure 1d: Frequency of bike commuters encountering cracks and holes in the path.
Figure 1e: Frequency of bike commuters encountering discontinuous paths.

Figure 1f: Frequency of bike commuters encountering narrow/ending bicycle lanes.

Figure 1g: Frequency of bike commuters encountering difficult intersections.
Table 1. How Often Do You Encounter the Following Obstacles on Your Trip Route?

<table>
<thead>
<tr>
<th>Obstacle</th>
<th>Routinely</th>
<th>Occasionally</th>
<th>Rarely</th>
<th>Never</th>
<th>No Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggressive motorists</td>
<td>8%</td>
<td>32%</td>
<td>38%</td>
<td>18%</td>
<td>4%</td>
</tr>
<tr>
<td>Pedestrians in the bicycle lane</td>
<td>25%</td>
<td>36%</td>
<td>23%</td>
<td>13%</td>
<td>4%</td>
</tr>
<tr>
<td>Debris in the roadway/ bike lanes</td>
<td>17%</td>
<td>30%</td>
<td>35%</td>
<td>15%</td>
<td>4%</td>
</tr>
<tr>
<td>Cracks, holes, or other poor pavement conditions</td>
<td>49%</td>
<td>24%</td>
<td>17%</td>
<td>6%</td>
<td>4%</td>
</tr>
<tr>
<td>Discontinuous or no through route</td>
<td>12%</td>
<td>33%</td>
<td>23%</td>
<td>27%</td>
<td>5%</td>
</tr>
<tr>
<td>Narrowing or ending of bicycling space</td>
<td>16%</td>
<td>32%</td>
<td>32%</td>
<td>17%</td>
<td>4%</td>
</tr>
<tr>
<td>Difficult intersections ¹</td>
<td>16%</td>
<td>22%</td>
<td>27%</td>
<td>28%</td>
<td>7%</td>
</tr>
</tbody>
</table>

A majority of respondents (73 percent) report finding cracks, holes, or other poor pavement conditions at least occasionally along their route, while 23 percent report rarely or never encountering these obstacles. “Debris in the roadway” is routinely and occasionally reported by 47 percent of respondents. Behavioral issues that affect bicyclists include “aggressive motorists,” reported on trip routes by 40 percent of respondents, and “pedestrians in the bike lanes,” which 61 percent of respondents report encountering at least occasionally. “Narrowing or ending of bicycling space” was reported as an occasional obstacle by 32 percent of respondents, but was reported as never an obstacle by 17 percent. “Discontinuous or no through-routes” was reported as an occasional obstacle by 33 percent of riders surveyed, and 50 percent of respondents reported rarely or never encountering this obstacle.

¹The George Bush Drive/Wellborn Road intersection received the most complaints at 10 (bicycle rider volume at this intersection was 9%); the Texas Avenue/University Drive intersection received six complaints (this intersection was not included in the bicycle count, as it is not a campus entry point); and the College Main Street/University Drive intersection received four complaints (count volume was 3% of total at this intersection).
The next question was designed to discover the most difficult problems identified by bicyclists. Respondents were instructed to check boxes in an “any and all that apply” format. With the exception of “bicycling space too narrow” (16 percent), the other response rates are very similar to each other and are provided in Table 2.

Table 2. Frequency of Perceived Obstacles to Bicycling to/from TAMU.

<table>
<thead>
<tr>
<th>Most Difficult Problems</th>
<th>Freq.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of respect from drivers</td>
<td>32%</td>
</tr>
<tr>
<td>Difficult intersections</td>
<td>32%</td>
</tr>
<tr>
<td>Other bicyclists ignoring rules</td>
<td>31%</td>
</tr>
<tr>
<td>Too few bicycle routes/paths</td>
<td>31%</td>
</tr>
<tr>
<td>Poor lighting</td>
<td>28%</td>
</tr>
<tr>
<td>Poorly maintained bicycle paths</td>
<td>25%</td>
</tr>
<tr>
<td>Discontinuous bicycle routes</td>
<td>25%</td>
</tr>
<tr>
<td>Bicycling space too narrow</td>
<td>16%</td>
</tr>
</tbody>
</table>

The importance of these data reflecting perceived obstacles is in their application to occurrences in areas, or zones, of the community. Below, the survey data are analyzed by these “zones of occurrence.” Of the 144 completed questionnaires, 112 respondents reported a “point of origin” for their trip. To identify where problems are being experienced by these commuters, we divided survey respondents (based on origin location) into one of four zones. These zones cover the southwest, south, east, and north sides of campus, respectively (see Appendix B for map). Outlying origin points within one block of the adjacent zone are included in the total.
Figure 2: Zone 1 (with bicycle commuter points of origin).
Figure 3: Zone 2 (with bicycle commuter points of origin).
Figure 4: Zone 3 (with bicycle commuter points of origin).
Figure 5: Zone 4 (with commuter points of origin).

Since the volume of bicyclists varied by zone (21 in Zone 1; 31 in Zone 2; 11 in Zone 3; and 49 in Zone 4), these numbers were divided into the number of problems cited per person in each zone to obtain a rate. The most complaints per person came from Zone 1, the southwest side of campus, where the rate of complaints, 2.29 per respondent, was not significantly different from Zones 2 and 4 (2.25 and 2.16 per person, respectively). Zone 3, the east side of campus, which had the fewest respondents, had the lowest rate of complaints, less than one (0.9) complaint per respondent.
More than half of respondents in Zone 1 indicated a problem with difficult intersections. Zones 2 and 4 had similar rates of complaints overall, and respondents specifically reported too few bicycle routes as a common problem. In Zone 3, poor lighting had the highest number of complaints, and in Zone 4, poorly maintained bicycle paths and poor lighting were the most frequently reported problems. Table 3 illustrates these data in the format of complaints per person by population and zone.

### Table 3. Commonly Identified Problems by Zone.*

<table>
<thead>
<tr>
<th>Problem</th>
<th>Zone 1 (SW)</th>
<th>Zone 2 (S)</th>
<th>Zone 3 (E)</th>
<th>Zone 4 (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too few bicycle routes/paths</td>
<td>0.33</td>
<td>0.32</td>
<td>0.09</td>
<td>0.31</td>
</tr>
<tr>
<td>Poorly maintained bicycle paths</td>
<td>0.33</td>
<td>0.23</td>
<td>0.09</td>
<td>0.35</td>
</tr>
<tr>
<td>Discontinuous bicycle routes</td>
<td>0.14</td>
<td>0.29</td>
<td>0.00</td>
<td>0.29</td>
</tr>
<tr>
<td>Bicycling space too narrow</td>
<td>0.10</td>
<td>0.19</td>
<td>0.00</td>
<td>0.18</td>
</tr>
<tr>
<td>Lack of respect from drivers</td>
<td>0.24</td>
<td>0.29</td>
<td>0.09</td>
<td>0.29</td>
</tr>
<tr>
<td>Other bicyclists ignoring rules</td>
<td>0.48</td>
<td>0.32</td>
<td>0.09</td>
<td>0.27</td>
</tr>
<tr>
<td>Difficult intersections</td>
<td>0.52</td>
<td>0.35</td>
<td>0.18</td>
<td>0.14</td>
</tr>
<tr>
<td>Poor lighting</td>
<td>0.14</td>
<td>0.26</td>
<td>0.36</td>
<td>0.35</td>
</tr>
<tr>
<td><strong>Total identified problems, per person</strong></td>
<td><strong>2.29</strong></td>
<td><strong>2.25</strong></td>
<td><strong>0.90</strong></td>
<td><strong>2.16</strong></td>
</tr>
</tbody>
</table>

* Responses per person, n = 112.

To assess any potential sources of sampling bias contained in survey one (“commuter survey”) regarding the proportion of commuters originating from each zone, the sample population was tested against the total inbound bike traffic volumes recorded at campus entrances (see Appendix B for map) adjacent to each of the defined zones (Figure 6, Table 4). By comparing the difference in sample proportion between the two surveys for each zone, it could be determined if any zones were over- or under-sampled in the rider survey. This comparison was made using a test of significant differences at the 0.05 level (95 percent confidence interval). No significant differences in proportion were found for Zones 1, 2, or 3. The test found that the proportion of bicycle riders interviewed who reported originating from Zone 4 was significantly less than the proportion of bicycle riders counted for inbound traffic volumes (Figure 7, Table 5). To control for the possibility of interviewing a disproportionate number of commuters from a particular zone, interviewers were posted adjacent to all zone entrances (including Zone 4) for the entire survey day, 7:30 a.m. – 5:30 p.m.
Figure 6: Percent breakdown of bicycle commuters entering by zone, according to count.

![Figure 6: Percent breakdown of bicycle commuters entering by zone, according to count.](image)

Table 4: Data for Figure 6.

<table>
<thead>
<tr>
<th>Zone</th>
<th>Number of respondents from each zone</th>
<th>Percent related to total in-bound traffic volume for each zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 1</td>
<td>21*</td>
<td>19%</td>
</tr>
<tr>
<td>Zone 2</td>
<td>31*</td>
<td>28%</td>
</tr>
<tr>
<td>Zone 3</td>
<td>11*</td>
<td>10%</td>
</tr>
<tr>
<td>Zone 4</td>
<td>49*</td>
<td>43%</td>
</tr>
<tr>
<td>n</td>
<td>112</td>
<td></td>
</tr>
</tbody>
</table>

**Outliers within one block from each zone were included in the responses for that zone.
Figure 7: Breakdown by percent of bike commuter volumes per zone/point of origin.

Table 5: Data for Figure 7.

<table>
<thead>
<tr>
<th>In-bound Volumes per Zone</th>
<th>Bike commuter count per Zone</th>
<th>Percent of bike commuter volumes per Zone/point of origin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 1</td>
<td>218</td>
<td>11%</td>
</tr>
<tr>
<td>Zone 2</td>
<td>415</td>
<td>22%</td>
</tr>
<tr>
<td>Zone 3</td>
<td>153</td>
<td>8%</td>
</tr>
<tr>
<td>Zone 4</td>
<td>1,120</td>
<td>59%</td>
</tr>
<tr>
<td></td>
<td>1,906</td>
<td></td>
</tr>
</tbody>
</table>
Question number 9 asked “Why do you bicycle?” This question was also presented in a “check all that apply” format; therefore, answers are independent of each other and can each score 100 percent. The most frequent response (Table 8) was “bicycling is more convenient” (72 percent). More than half of respondents said they bicycle because they find parking a vehicle on campus difficult (54 percent) or too expensive (53 percent). The least frequently offered reason for riding a bicycle to campus was that the bicyclist had no access to a vehicle (13 percent). These data suggest that bicyclists ride to campus because they choose to, not because they lack alternatives.

The final survey question was about helmet use. Of the 144 bicyclists interviewed, only 8 respondents (6 percent) reported regularly wearing a helmet. Reasons for not wearing helmets included not owning one, helmets are uncomfortable or inconvenient, helmets mess up hair, helmets are “dorky” or otherwise silly looking, bicycling in the community and on campus is perceived to be low risk, and “Just stupid, I guess.”

**Figure 8: Survey question #9: “Why do you bicycle? (check all that apply).”**

The final survey question was about helmet use. Of the 144 bicyclists interviewed, only 8 respondents (6 percent) reported regularly wearing a helmet. Reasons for not wearing helmets included not owning one, helmets are uncomfortable or inconvenient, helmets mess up hair, helmets are “dorky” or otherwise silly looking, bicycling in the community and on campus is perceived to be low risk, and “Just stupid, I guess.”

**Count**

Several techniques for conducting effective bicycle counts are discussed in the literature. Many universities (e.g., Arizona State University in Tempe, the University of Texas in Austin, and the University of Washington in Seattle) estimate bicycle commuter rates by assessing bike rack usage at a particular time of day. While such methods produce an aggregate number of
bicycles on campus at any one point in time, bicycle *commuters* are only part of that sum. Numerous bicycles are brought to campus attached to vehicles or in truck beds; many more are left at bike racks for on-campus use only. Bike rack usage estimates do not produce accurate *commuter* trip data and most mechanical means of counting bicycles present problems, thus the need for an on-site, real-time, physical count of daily bicycle commuters. A review of techniques used by other communities and universities to quantify bicycle use led us to conclude that the preferred method is the use of human “counters.”

The TAMU bicycle-commuter count was conducted manually by posting counters at 12 campus entrances (see Appendix B for map), including parking lots that were likely to be used as entrances and shortcuts. The counters included personnel from the City of College Station and TTI and a number of campus bus drivers provided by TAMU Transportation Services. In a 1-hour orientation conducted by the researchers, counters were instructed to create an “imaginary line” at their entrance and count any bicycle that crossed that line entering or leaving campus.

A typical Tuesday was selected for the count, given that Tuesday is, according to TAMU Transportation Services, the busiest weekday for vehicular traffic and parking. The weather was cool and windy, until 5 p.m., when storm clouds and lightning moved in. The count was to run from 7:30 a.m. to 7:30 p.m., but because of threatening weather the count was terminated at 5:30 p.m. Stopping the count early is the likely reason for more bicyclists being counted entering campus than leaving.

Since the task was to count commuting bicycles, researchers omitted those riders entering campus from the west side, which would primarily be intracampus trips. It was assumed that bicycles entering from off-campus on the north, south, and east were commuters. Only two bicyclists were counted in the first two hours of counting at the east entrance to PA (parking area) 50, so the site was abandoned, leaving 11 entrance points under surveillance. Subsequent observations by the researchers revealed that many bicycles were coming from nearby off-campus housing and entering at the southwest corner of campus. On Tuesday, April 12, bicycle traffic at the southwest corner of campus, including the intersections of George Bush Drive with Olsen Drive, Marion Pugh Street, and Wellborn Road, was counted by survey staff stationed on the fourth floor of the Callaway House dormitory’s parking garage, and this site is labeled as the twelfth entrance. Weather conditions were clear, cool, and slightly breezy on that day. The count was conducted from 7:30 a.m. to 5:30 p.m., as was the initial count. A total of 218 bikes were counted entering campus, and 194 were counted leaving campus during this count. These numbers were added to the initial count, for a total of 1,908 incoming trips and 1,543 outgoing trips (Figure 9). (See appendix C for details.)
According to the count data, University Drive at Ireland Street (Intersection 9) and University Drive at Houston Street (Intersection 11) were the two busiest intersections for bicyclists, each carrying over 500 bicyclists (16 percent of total bicycle trips) in and out of campus, while the intersections with the lowest counts were University Drive at Asbury (Intersection 10) with 3 percent, University Drive at Bizzell Street (Intersection 6) also with 3 percent, and University Drive at PA 5 (Intersection 8) with 2 percent of total bicycle trips counted. Possible explanations for the differences in bicycle traffic are discussed in the Data and Analysis section of this report.

The George Bush Drive/Wellborn Road area had the third highest traffic count (11 percent). This is an area of high-density housing across the street from the southwest corner of the TAMU campus. The nearby Callaway House dormitory provides a covered parking garage with bicycle racks on the first floor (lighted and under 24-hour video surveillance), which may make bicycling more convenient than driving to campus and having to park and walk. Additionally, the north side of campus had the highest volume of bicycle traffic. This is also an area of high-density housing, including the new Traditions private student housing complex. This area also includes retail and restaurant trades. The tables in Appendix C show count data by intersection and time-of-day.
Figures 10–24 are photographs and descriptions of the 12 entrance points to campus from which the research team observed and counted bicycle commuters.

George Bush Drive (facing east) at Houston Street. This three-way intersection has pedestrian-actuated signals and both sidewalks and bike paths on Houston Street. This bike lane on George Bush Drive is identified by pavement markings and signs. There is no sidewalk along the south side of this stretch of George Bush Drive (note the footpath), and encroaching brush further impedes pedestrian travel. Pedestrians often walk in the bike lane here. Seven percent of bicyclists counted use this entrance.

Figure 10: Intersection 1.

Another view of George Bush Drive at Houston Street (facing north toward the main Texas A&M campus) shows the crosswalk with pedestrian-actuated signals that leads to sidewalks and bike lanes on Houston Street.

Figure 11: Intersection 1 (Photo 2).
George Bush Drive at Throckmorton/Coke Streets (facing southeast, away from the Texas A&M campus). This intersection has crosswalks and pedestrian-actuated signal boxes. Bicycle traffic merges with vehicular traffic at this intersection. Six percent of bicyclists counted use this intersection.

Figure 12: Intersection 2.

Pedestrian traveling east on George Bush Drive approaching the intersection with Bizzell/Timber Streets. Both George Bush Drive and Bizzell/Timber Streets have bicycle lanes and sidewalks at this location. Here, the bike lane also serves as a buffer between pedestrians on the sidewalk and vehicles. Eight percent of bicyclists counted use this entrance to campus.

Figure 13: Intersection 3.
George Bush Drive and Bizzell Street intersection (facing north toward the Texas A&M campus). This intersection has crosswalks and pedestrian-actuated signal boxes.

Figure 14: Intersection 3 (Photo 2).

New Main Street (facing west), considered the main entranceway to the Texas A&M campus, has been improved and both sides have wide (6 feet) bike lanes, wide sidewalks (6 feet) with a grassy buffer between the sidewalk and the street, pedestrian-scaled lighting, and street trees to provide shade for pedestrians. A raised grassy median provides additional protection for pedestrian and bicycle crossing. Eight percent of bicycles counted used this entrance to campus.

Figure 15: Intersection 4.
Texas Avenue and New Main/Walton Streets (facing east away from the Texas A&M campus), has pedestrian-actuated signal boxes and crosswalks on both sides of all streets, as well as bicycle lanes on New Main/Walton Streets. Texas Avenue does not have bike lanes, so north-south bicycle traffic uses the sidewalk located on the TAMU campus, near the southbound lane of Texas Avenue, which serves as a shared-use path.

Figure 16: Intersection 4 (Photo 2).

University Drive at PA 50 was improved to include a paved median (with curb cuts that aid bicyclists as well as pedestrians) and crosswalks with both signage and pedestrian-actuated signals. During observations here, researchers found that many bicyclists spent time waiting on the median to cross against the light. Six percent of bicyclists counted used this entrance to campus.

Figure 17: Intersection 5.
University Drive at South College Avenue/Bizzell Street is one of the largest and busiest intersections entering campus and was the second most mentioned as a problem intersection in our survey of bicyclists. Only 3 percent of bicyclists entering campus use this entrance, possibly because of the large number of vehicles passing through or perhaps because there are no bike lanes on South College Avenue, causing bicyclists to choose alternate routes.

**Figure 18: Intersection 6.**

University Drive at Spence Street has crosswalks and pedestrian-actuated signals. On the left side of this photo is Spence Street, which is a two-way street on campus. On the right, the street becomes a driveway that leads to a parking lot with restaurant and retail establishments, and beyond is high- and moderate-density housing. This parking lot is used as a shortcut by bicyclists, and 10 percent of bicyclists counted entering or leaving campus used this intersection.

**Figure 19: Intersection 7.**
University Drive at Ireland/Nagle Streets is a one-way street entering campus from an area of moderate-density housing and is one of the two highest bike volume intersections, carrying 17 percent of bicyclists entering and leaving campus. There are also substantial amounts of pedestrian and vehicle traffic at this intersection.

University Drive at PA 5. This small faculty/staff parking lot is a mid-block driveway that is used as a shortcut for bicyclists. Three percent of bicyclists counted used this entrance.

Figure 20: Intersection 8.

Figure 21: Intersection 9.
University Drive at Asbury Street, which is a one-way street leaving campus. The street has no bike lanes; however, there are well-delineated crosswalks with pedestrian-actuated signals and sidewalks on both sides of the street. This intersection was used by 3 percent of bicyclists observed during the count.

Figure 22: Intersection 10.

University Drive at Houston Street/College Main is a large intersection between campus dormitories and restaurant/retail on the city side. This is one of the two highest bike volume intersections, carrying 17 percent of bicyclists entering and leaving campus. Researchers observed a moderate amount of pedestrian traffic through this intersection.

Figure 23: Intersection 11.
An underpass under Wellborn Road at Joe Routt Street eliminates conflicts with vehicles. Colored pavers help to separate pedestrians and bicyclists (not part of the bicycle count).

Figure 25: West side underpass.

George Bush Drive at Wellborn Road/Marion Pugh/Olsen Boulevard was counted as a single “intersection,” although it is composed of three divergent paths to campus. Adjacent high-density housing generates many bicycle trips. Counters observed that most bicycles cross George Bush Drive and use a path that runs parallel to Wellborn Road. Some bicyclists use Olsen Boulevard, and a few continue on George Bush Drive. No bicyclists were observed riding on Wellborn Road. Eleven percent of bicyclists counted used this intersection.

Figure 24: Intersection 12.
The Wellborn Road underpass is well-lighted, has telephones available, and is under constant video surveillance, offering users a sense of security. Colored pavement is designed to separate pedestrian and bicycle travelers. (Photo 2)

Figure 26: West side underpass (photo 2).
Survey Two: Bicycle Commuters

On April 29, 2005, Bike to Work Day provided an opportunity to collect additional survey data (Appendix D) from bicyclists regarding preferences for improved facilities and identification of the type and location of barriers along existing routes. Interviewers from TTI and from the City of College Station approached bicyclists as they were lined up at Freebird’s World Burrito restaurant for free burritos being provided to commuter bicyclists (see Figures 27, 28, and 29 below). A total of 58 questionnaires were completed on that day (another 16 questionnaires from survey two were completed during the noncommuter survey at the Memorial Student Center (MSC) on the TAMU campus on June 9, 2005, discussed below, and these were aggregated into a total of 74). Whereas survey one was oriented toward commuting habits, survey two was designed for identifying problems and preferences for improvements. The questionnaire developed for survey two was comprised of open-ended questions, and the responses were later coded and grouped.

Figures 27 and 28: Bike to Work Day at Freebird’s World Burrito restaurant afforded an opportunity to talk with bicycle commuters.
Figure 29: Jason takes a survey from a commuter bicyclist at Bike to Work Day at Freebird’s World Burrito.
Ninety percent of these commuter bicyclists reported riding to campus three to five times per week, and 10 percent reported riding once or twice per week on average. The main problem encountered by 37 percent of respondents in “bike commuting to and from campus” was identified as inadequate pathways (see Figure 30). Comments included a lack of dedicated bike lanes/paths, as well as problems with existing lanes/paths, such as poor pavement conditions, and places where bike lanes suddenly end. Twenty-three percent of the respondents reported that dealing with drivers was their biggest commuting problem, and 16 percent said they have no problems along their commute. Eight percent of this group of bicycle riders said that intersections and traffic signals presented their most significant problem, with comments such as “difficulty in crossing Texas Avenue and George Bush Drive” and “bicycles not tripping traffic detectors for signal changes.” “Dealing with pedestrians,” “problems with other bicyclists,” “lack of bicycle parking on campus,” and dealing with “the train” was each reported by 1 percent of riders surveyed. The researchers coded 9 percent of the answers as “other,” and 3 percent of survey respondents did not answer this question.

Figure 30: Major obstacles to bicycle commuting to/from campus (categories provided on survey).
A total of 37 percent of this group of commuter bicyclists surveyed said that pedestrians are the major obstacle to bicyclists commuting on campus, and 12 percent reported that pathways are inadequate (see Figure 31 below). Dealing with vehicles and other bicyclists were each reported as the main problem by 5 percent of this survey group. Bicycle theft on campus was also reported by 5 percent of respondents as their primary concern. Intersections, cars parked in bike lanes, and answers coded as “other” comprised 7 percent of responses, and 5 percent of respondents did not answer this question. Finally, 19 percent of the survey respondents reported no problems while bicycling on campus.

Figure 31: Major obstacles to bicycle riding on campus (categories provided on survey).
Additionally, when asked what single step the cities or TAMU could take to improve bicycling, a statistically significant majority (55 percent) of responses pertained to improving the quality and/or quantity of bicycle paths (Figure 32). The second most common answer (12 percent) was improving education and awareness among bicyclists, pedestrians, and motorists to reduce conflict and improve safety. Adding more bike racks on campus was the improvement of choice for 8 percent of respondents, and 8 percent answered that they could recommend no changes. Twelve percent of responses were coded as “other,” and 4 percent of respondents did not answer this question.

![Figure 32: Distance (miles) bike commuters would travel out of their way to use safer bikeways.](image)

The researchers asked bike commuters about safer bike routes, and a majority (69 percent) of survey respondents replied they would travel (an average of 1.1 miles) out of their way to use safer bikeways, while 30 percent answered they would not. Figure 32 illustrates that 75 percent of these commuters (69 percent group) are willing to travel up to 1 mile out of their way to use safer bikeways. Only 1 percent of survey respondents did not answer this question.
Three questions related to trip end facilities were included in the survey (Figure 33). When asked if they would bike commute more if protected bicycle parking was available, 50 percent of respondents said yes, 39 percent said no, and 11 percent did not answer. When asked if they would be willing to pay for a personal bicycle locker, 72 percent said no, 20 percent said they would pay (an average maximum of $26 per year), and 10 percent did not answer. Respondents were also asked if they would pay for covered bicycle racks: 68 percent said they would not pay, 22 percent said they would pay, and 11 percent did not answer. Finally, this group of bicycle commuters was asked if showers and changing facilities would encourage them to bicycle commute more often; 54 percent responded “yes,” and 46 percent said “no.”

![Figure 33: Bike commuter preference for trip end facilities.](image)

In summary, the main problem bicycle commuters report in bicycling off-campus is inadequate pathways (37 percent); when biking on campus, however, these same commuters report problems with pedestrians as the main issue (37 percent). When asked what improvements would most likely get them to ride more, the majority of commuters stated that improving pathways was their primary preference, which is reinforced by the response that safer pathways would also encourage them to ride more. Trip end facilities seem to be less important an issue. Although 50 percent of this group of survey respondents said that covered parking may encourage them to ride more, only 20 percent said they would be willing to pay for the use of such facilities.

**Survey Three: Nonbicycle Commuters**

To satisfy the objective of determining what changes might promote bicycle commuting among current nonriders, on Wednesday, June 8, 2005, three survey takers were stationed in the lobby of the TAMU MSC where passersby were intercepted and asked if they were students, if they live off campus, and how they travel to campus. If they commuted to campus by any mode
other than bicycle, these students were asked a half-page questionnaire (see Appendix E) about why they do not bicycle commute and what could be done to encourage them to ride. This survey consisted of seven open-ended questions intended to elicit spontaneous responses that would later be coded and aggregated.

Ninety-nine nonbicycle commuters responded to the survey, of which 90 respondents reported never commuting to campus on a bicycle (see Figure 34). Sixty-one percent of the 99 bicyclists surveyed said they usually drive a personal vehicle to campus. Just over 22 percent said they regularly ride the bus, and 12 percent responded they sometimes drive and sometime ride the TAMU bus. There were four respondents who stated they walk, one other respondent rides a motorcycle, and one student drives to campus but occasionally commutes by bicycle.

![Figure 34: Modes of transportation for nonbicycle commuters.](image-url)
Reasons for not bicycle commuting include not having a bike available (34 percent), living too far from campus (24 percent), adverse weather (9 percent), and feeling that bike riding in the community is too dangerous (5 percent) (see Figure 35). While the researchers expected the heat and other weather conditions to have a significant negative impact on bicycle ridership, only 9 percent of the respondents in this sample reported such an impact. There were 22 responses grouped as “other,” which includes a preference to drive (3 percent), a preference for the bus (3 percent), and inability to ride a bike (3 percent), with the least reported reasons for not bicycle commuting as “don’t like to get sweaty,” “don’t like physical exertion,” and “it’s a hassle.” Six percent did not respond to this question.

Figure 35: Reasons for not bicycle commuting to/from campus.
When asked what changes TAMU or the cities could make to encourage bicycle commuting, 42 percent of respondents said that nothing can be done to convince them to ride a bicycle to campus (Figure 36). A total of 26 percent of the respondents mentioned pathways as an issue in their decision not to bicycle commute and said that improving bicycle pathways (14 percent) or adding bicycle pathways (12 percent) might encourage them to ride. Other responses included decreasing bicycle theft on campus (3 percent), reducing pedestrian/bicycle conflicts (2 percent), and increasing bicycle parking facilities as incentives to increase bicycle commuting. Thirteen percent of survey respondents did not answer this question. Nineteen percent of responses were classified as “other,” some of which include lower the cost of bicycles (2 percent); “flatten the roads” (1 percent), offer financial incentives (1 percent), and educate drivers, bicyclists, and pedestrians about bicycle rules (1 percent). Bicycle theft is known to be problem on campus; however, it does not seem to be a determining factor in the decision to bicycle commute to campus.

Figure 36: Changes by university or city that could encourage bicycle commuting.
When asked if a safe, direct route would encourage them to bicycle commute (see Figure 37), 45 percent of survey respondents said “yes” and 17 percent said “no.” Twenty-one percent of the respondents provided answers coded as “other,” which included “maybe” and “probably,” and 17 percent of those surveyed did not answer this question. An interesting observation is that 11 percent of the group of 45 percent of respondents that stated they would bicycle commute if a safe and direct route were available had previously stated that no changes made by the TAMU or cities would encourage them to bicycle commute. This apparent contradiction could be interpreted as a desire for more and better bikeways in the community or, as mentioned in the background section of this report, may be attributed to bias inherent in stated preference surveys.

Figure 37: Would safe and direct routes encourage bicycle commuting?
Trip end facilities are often discussed as incentives to encourage bicycle commuting. When asked if they would bike more if improved bicycle parking (such as covered parking or bicycle lockers) were provided, nonbicycle commuters were fairly evenly divided on the issue (Figure 38). Thirty-eight percent said such facilities would not get them to bicycle commute more, 30 percent said they would bicycle commute more if protected bicycle parking was available, and 13 percent of those surveyed did not answer “yes” or “no,” but gave answers coded as “other,” such as “maybe,” “that would be nice,” or similar responses. Nineteen percent of respondents did not answer this question.

![Pie chart showing responses to whether improved bicycle parking would encourage bicycle commuting.](image)

**Figure 38: Would improved bicycle parking encourage bicycle commuting?**
When asked if the addition of showers and lockers might have an effect on their commute mode, more than half (57 percent) of the nonbicycle commuters interviewed said that they would not bike commute more frequently if convenient showers and changing facilities were available on campus, 22 percent answered “yes,” and 21 percent gave answers coded as “other” (Figure 39).

![Pie chart showing the percentages of responses to the question about shower facilities and lockers encouraging bicycle commuting.]

Figure 39: Would shower facilities and lockers encourage bicycle commuting?
CHAPTER 3: CONCLUSIONS

These conclusions consist of a summary of the goal and objectives, with commentary on how these objectives were met.

Research objectives included determining how many people currently bike to campus on a typical class day. The TAMU student body consists of approximately 45,000 students. According to the count conducted for this project, approximately 3,000 bicycle commute trips are made between campus and the community on a typical class day. This number was obtained by observational counts and may be an undercount due to weather conditions preventing a full day of observation. (Many universities count bicycles at racks to estimate bicycle commuter volumes; however, we considered this method less accurate due to the high number of bicycles permanently kept on the TAMU campus.)

Another project objective was to discover routes bicyclists use to get to and from campus and to find what areas in the community are in need of improvements to the bicycling environment. The north and southwest sides of the TAMU campus have high-density development, and researchers found high rates of bicycle traffic in these locations. The east side of campus is developed as restaurant/commercial and lower-density housing, and fewer bicycle trips are generated from this area. It is important to note that several intersections and crosswalks are present on the north and southwest sides of campus, while there are only two signalized crossings between the city and campus on the east side.

The project included an objective of determining the problems bicyclists encounter along their commute. Bicycle commuters reported inadequate pathways, including poor pavement conditions as well as too few pathways, aggressive motorists, and difficult intersections/traffic signals as their major obstacles to bicycling to campus. The third most frequent response was that the rider found no problems along their commute. This indicates that either some bicyclists are more tolerant of problems, travel too short a distance to encounter problems, or that areas of the community are problem free.

Another project objective was discovering characteristics (physical barriers, behavioral issues, other) of the bicyclists’ route that affect comfort level and determining those facilities that contribute to a perception of safety or hazard. According to the results of our second stated preference survey (with open-ended questions), 55 percent of the respondents would like to have more and/or better pathways. A total of 37 percent said that inadequate bicycle paths are their biggest obstacle in bicycling to campus, and 21 percent said their biggest problem was dealing with drivers. Respondents’ comments made in the course of the interview process indicated that separate, dedicated pathways would be their preference, and 69 percent of respondents said they would bicycle more if a safe and direct route was available. It could be concluded from these responses that creating a system of dedicated bicycle pathways would be the best step toward increasing bicycle commuting in the community.

Next, researchers investigated the hypothesis that bicycle activity would increase if bicycling were made safer. As mentioned above, based on the second stated preference survey, 69 percent of respondents said that a safe and direct path would encourage them to ride more. Researchers
reviewed recent bicycle accident statistics for areas of the city adjacent to campus and found nine reported accidents in the year 2002, four accidents in 2003, and six accidents in 2004. Since historical accident data (from 1975, the year of the BVLWV bicycle count and survey) are not available, to prove the hypothesis that a safe and direct route would encourage riding would require that improvements be made and subsequent studies conducted.

The goal of this project was to determine the potential to increase bicycle use in the Bryan – College Station – TAMU community. We focused our research on Texas A&M University and the immediate surrounding area, as the university is the largest trip generator in the community. We determined through surveys that bicycle ridership could be increased with safe and direct routes between the university and residences. The results of our stated preference survey of nonbicyclists indicate that 42 percent of respondents, *for reasons not related to the bicycling environment*, could not be encouraged to bike. Fourteen percent, however, said that improving pathways might encourage them to bicycle commute to campus. These results indicate that increasing and/or improving bicycle pathways may encourage some nonbicyclists to ride.

In order to quantify potential increases in bike ridership due to additions to or improvements in pathways, it is first necessary to obtain estimates of the average daily incoming volume of students to campus by other modes of travel. Based on figures obtained from Texas A&M Parking and Transportation Services, approximately 22,000 students enter campus daily through modes other than bicycle. In our final survey, 5 percent of nonriders stated that their primary reason for not bicycling to campus is “too dangerous/safety.” Applying this proportion to the total daily incoming volume of nonriders gives a total of 1,100 students. Using the 45 percent proportion of nonriders that stated having a safe, direct route to campus would increase their bike usage, we estimated that approximately 500 (45 percent of 1,100) additional students may bike to campus daily if appropriate route changes are made.
CHAPTER 4: RECOMMENDATIONS

It is clear from the data analysis that the areas of high-density residential (southwest and north sides of campus) and/or high-density restaurant and trade (north side) have the highest levels of bicycle traffic. In reviewing the survey and count data, the conclusion can be drawn that increasing the density of residential and student-oriented business development within a reasonable distance (one-half mile is the maximum distance most people are willing to walk to a destination, and most people will bicycle up to 3 miles to a destination) of campus, could increase pedestrian and bicycle commuting and may reduce the need for additional vehicle parking on campus. This high-density development coupled with increased connectivity to campus through interconnecting pedestrian and bicycle paths could help create an environment that not only encourages walking and bicycling as routine forms of transportation, but may also prioritize walking and bicycling over vehicle use. This could move the campus area toward the City of College Station’s and TAMU’s goals of making roadways adjacent to campus “parkways” to enhance the pedestrian and bicyclists’ environment and integrate the campus with the city. The researchers recommend that the cities and TAMU continue to work together on a master bikeway plan that will connect all parts of the city with dedicated bikeways.

Additionally, the researchers recommend that the Cities of Bryan and College Station and TAMU implement educational programs to make pedestrians, bicyclists, and motorists aware of rules and regulations that may reduce conflict and thereby improve safety.

FUTURE RESEARCH NEEDS

The researchers recommend that the City of College of Station and TAMU conduct bicycle counts every 2 years. This would not only track bicycle system usage to determine if bicyclists are increasing or decreasing in number but could help ascertain where implemented changes to the bicycle system are working and where additional changes may be needed.

The researchers also recommend that a survey of motorists be conducted at campus parking lots to determine why commuters choose to drive and what could be done to encourage and promote bicycle commuting from off-campus locations to campus.
APPENDIX A: SURVEY ONE

Survey location (name of building or street): ________________________________

1) How did you get to campus today? ☐ Walk ☐ Bicycle ☐ Bus ☐ Car ☐ Other:___________

2) Where did your trip to campus begin today? (closest intersection) ________________________________

3) How many times per week on average do you make this trip?
☐ Less than once a week ☐ 4-6 times per week
☐ 1-3 times per week ☐ Daily

4) What route did you take today? (list major streets used)_________________________________________

5) Why did you choose this route? (check all that apply)
☐ Most direct ☐ Bike route
☐ Avoid traffic ☐ Other _____________________________

6) When making this trip do you usually follow the same route? ☐ Yes ☐ No
Why? __________________________________________________________________________________

7) How often do you encounter the following obstacles on your trip route?

Routinely Occasionally Rarely Never
Aggressive motorists
Pedestrians in the bicycle lane
Debris in the roadway/bike lanes
Cracks, holes, or other poor pavement conditions
Discontinuous or no through route
Narrowing or ending of riding space
Difficult intersections (*list below)
Other:
*Intersections that are difficult to cross and why:

________________________________________________________________________________________
________________________________________________________________________________________

8) Which of these do you see as obstacles to bicycling in this community? (check all that apply)
☐ Too few bicycle routes/paths ☐ Lack of respect from drivers
☐ Poorly maintained bicycle paths ☐ Other bicyclists ignoring rules
☐ Discontinuous bicycle routes ☐ Difficult intersections
☐ Bicycling space too narrow ☐ Poor lighting
☐ Others/comments _____________________________

9) Why do you bicycle? (check all that apply)
☐ Parking difficult ☐ Exercise/health
☐ Parking too expensive ☐ More convenient
☐ Save environment ☐ No access to vehicle
☐ Conserve fuel ☐ Other(s)___________

10) Do you usually wear a helmet? ☐ Yes ☐ No
Why, or why not? __________________________________________________________________________
APPENDIX B

Zone Map with Entrance Numbers
## TAMU Bicycle Count Totals (in and out) March 2005

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Count Total Incoming

TAMU Bicycle Count Totals (incoming only) March 2005

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X = no count taken in this time slot
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X = no count taken in this time slot
APPENDIX D: SURVEY TWO

SWUTC 1674550 Survey II of Bicyclists, 2005

Did you answer our campus bicycle survey in November? Yes   No

What is the main problem you encounter in bike commuting to and from campus?

What is the main problem you encounter in bicycling on campus?

In order of importance, list the most troublesome spots (street name and/or nearest building/landmark) you encounter along your commute (city and/or campus):

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<tr>
<th>Problem location</th>
<th>The problem</th>
<th>Suggested solution</th>
<th>Comments</th>
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What single step could the University or the Cities take to improve bicycling?

How often do you bicycle commute to and from campus?

Would you bike to campus more often if protected bicycle parking were available? Yes   No

Would you pay for a covered bicycle locker on campus? Yes   No

How much per year? $________________________

Would you pay for a covered bicycle space? Yes   No

How much per year? $_______________________

What is the maximum distance (in miles or kilometers) you are willing to bicycle commute?

If bikeways were improved for safety but took you out of your way would you use them? Yes   No

Maximum distance (in miles or kilometers) you’re willing to travel out of your way on a safe bike route?

Would you bicycle commute more often if showers and changing facilities were available on campus? Yes   No

If yes, where would you want these facilities to be located?

Comments:
APPENDIX E: SURVEY THREE

SWUTC 1674550 Survey of Non Bicycle Riders, Summer Semester 2005

How do you usually get to campus?

How often do you ride your bicycle to campus? (If never, ask why, and if appropriate ask if there is anything the cities or university could do to encourage them to ride)

What changes could the University or the Cities make to get you to bicycle commute to campus?

If bikeways provided a safe and direct way to campus would you bike more?

Would you bike to campus more often if protected bicycle parking were available on campus?

Would you bicycle commute more often if showers and changing facilities were available on campus?
REFERENCES


20 Gary L. Jackson, Assistant Director, Parking, TAMU Transportation Services, email correspondence of 8/9/2005.