# Innovative Parking Management Strategies for Universities: Accommodating Multiple Objectives in a Constrained Environment

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# INNOVATIVE PARKING MANAGEMENT STRATEGIES FOR UNIVERSITIES: ACCOMMODATING MULTIPLE OBJECTIVES IN A CONSTRAINED ENVIRONMENT

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**ABSTRACT**

Universities face the challenge of balancing land use needs created by research, academic, and administrative functions with the necessity to provide land for transportation facilities. With few exceptions, parking demands represent the most critical challenge. University planners are responding with innovative approaches to balance the demands for parking space with competing, more desirable land uses.

This paper describes parking management practices of undergraduate and graduate universities in small or medium-sized cities based on the results of a survey completed by 34 universities. Results of this research confirm that new facilities are predominantly constructed on land previously used for surface parking, thus posing a challenge to university planners: balancing the supply and demand for parking space in an equitable and efficient manner. University parking practices and innovative management and technical approaches were identified. The study indicates that permits, meters, and cooperative efforts with the local authorities hold the most promise for effective management of parking demand. Expanding the range of options to the university community to include short-term parking and guaranteed ride home programs has the added benefit of reducing parking demand and the amount of land required for vehicle storage.

## INTRODUCTION

Universities must often balance a variety of competing demands for a finite land area. Open space and administrative, research, and academic buildings often take priority over transportation functions on the university campus. Thus, universities are an excellent environment in which to examine the transportation-land use relationship since they must manage space while maintaining mobility and accessibility. Parking often enters into land-use decisions as universities continue to focus on developing previously used land. Improved management of parking may increase the usage of transportation alternatives that consume less land, thereby making space available for institutional functions.

Many universities have become "landlocked" by the growth of surrounding communities. Thus, universities must optimize the usage of land they currently possess. The challenge for university planners, therefore, becomes organizing academic, research, administrative, athletic, and housing facilities and the transportation infrastructure it supports within limited space and financial constraints.

Because university campuses need solutions to the problems of excessive parking demand, congestion, inefficient land use, and maintenance of campus attractiveness/livability, they are also prime environments in which to experiment with new approaches to optimizing parking management. Further, a university environment, with creative faculty and students, should be a cauldron of new ideas and innovation in transportation applied to its own campus.

Other researchers have noted the impact of university transportation planning on parking needs. Kirkpatrick maintained that transportation planning begins at the departure point of the trip to and from the university so that the traveler's mode choice can be examined (*1*). This approach enables the creation of options regarding travel mode, rather than a single focus on storing vehicles that consume valuable land. Toor agreed that providing transportation options to campus users is more cost-effective than simply providing more parking options (*2,3*). Toor also recognized that some drivers are alternative users and need to drive occasionally. If they must purchase a full permit that allows unlimited parking, an incentive to use an alternative mode is diminished. Studies by both Miller and Daggett and Gutkowski revealed trends indicating the growing popularity of unlimited access programs and campus-community coordination to manage transportation demand (*4,5*). Bourne and Schauer noted substantial savings in new parking facilities from strategic investments in transit service (*6*). Brown et al. likewise found that unlimited access programs benefited the university by helping to relieve parking demand while filling empty seats on municipal service routes during off-peak hours (*7*). Rich stated that parking can be an asset to a campus by helping to attract prospective students and generate revenue from oversold permit sales and event parking (*8).*

Parking management is a single component of a multifaceted transportation demand management strategy, which may involve transit, car and van pooling, student residential policies, campus-community coordination and land use planning, bicycling programs, and more. This study reviewed parking management strategies currently used by universities, with a focus on how universities have balanced parking needs and other land uses. However, the findings may also be applicable to other municipal environments or large traffic generators.

## METHODOLOGY

The objectives of this study were: (1) identify the state of parking practices on university campuses, (2) identify innovative parking management and technology strategies, and (3) analyze the results to identify trends and lessons learned in university parking management practices. To accomplish this, the results of a survey of campus parking and transportation planners and administrators conducted in the summer of 2003 were analyzed. Information on the websites of the survey respondents was also reviewed. As with any survey-based data, the results are subject to interpretation, both by the survey respondents when answering questions and by the researchers when examining responses.

Literature on parking management and land use on university campuses was identified and reviewed to determine lessons learned. The results provided background on the challenges and issues facing universities with regard to parking management and helped identify important issues that should be covered in the survey of universities. The literature review suggested a set of universities that were leaders in managing parking by taking innovative and effective approaches to transportation and land use planning: the University of Colorado at Boulder, the University of Illinois at Urbana-Champaign, Iowa State University, the University of Michigan at Ann Arbor, Stanford University, the University of Wisconsin at Madison, the University of California at Berkeley, and the University of California at Davis. The traits of these universities were reviewed to determine their common characteristics in this regard. Criteria for selecting universities to survey were developed based on these common traits. The criteria used were (1) residential and commuter universities that offer at least a bachelor's degree; (2) universities with enrollments of at least 15,000; and (3) universities in cities with a population between 50,000 and 250,000.

The criteria for sample selection were entered into the College Search service on the CollegeBoard website. Sixty-four universities that met these criteria were identified. The parking and transportation office (or equivalent) of each was contacted prior to the distribution of the survey to introduce the project and achieve a greater response rate. Despite the lengthiness of the survey, the response rate was 53 percent, with 34 of the 64 surveyed schools responding. The purpose of the survey was to identify major trends in land use and transportation planning on university campuses, particularly with regard to parking management. The final survey was composed of 47 questions including multiple choices, open-ended, and rating questions. The survey respondents were also provided with opportunities to discuss any issues which they felt were significant but which had not been addressed by the survey (*9*).

### Results of the Survey

*Sample Group*

Table 1 displays the respondents grouped by setting (urban, suburban, and rural) and whether they are listed as residential or commuter campuses by the College Board. Of the respondents, 13 were urban campuses, 19 were suburban, and 2 were rural. Two of the urban schools and 7 of the suburban schools were commuter campuses. The urban/rural and residential/commuter designation is self-reported by the university, and these designations are based on subjective criteria. It should be noted that the population reported in Table 1 was based on the population for the specific city in which a university was located as reported in the 2000 U.S. Census. The

researchers did not attempt to define the entire population of the surrounding region, which could be considerably different from the population of just the city. Table 2 illustrates the breakdown of the sample group in terms of region, setting, and commuter/residential classification. As may be seen, not all responding universities had the data to answer every question.

*Automobile Usage*

Table 3 summarizes the usage of the automobile at the surveyed universities. Rural universities are not summarized since only two responded to the survey. Automobile use is categorized by whether the trip was to/from campus or within campus and by the setting and commuter/residential status. For more detailed information on relative share of alternate modes, readers are invited to consult the more detailed work by Isler and Hoel (*9*).

Table 3 reveals several interesting trends. First, urban campuses had a significantly lower proportion of automobile trips to/from campus than suburban campuses. This difference was statistically significant at a 95 percent confidence level. This result is intuitive given that parking availability is more restricted, costs are higher, and alternative modes are often more readily available for an urban campus. Likewise, commuter campuses have a statistically significant higher proportion of automobile trips than do residential campuses. Again, this makes sense since many students at residential universities already reside on campus or nearby and do not require an automobile to access campus. An examination of Table 3 shows that automobile trips within campus are lower than to/from campus. The same trends in automobile use from/to campus are seen for the within campus trips. The lower automobile usage within campus reflects the increased use of bus transit, walking, and bicycling.

*Existing and Newly Constructed Parking*

Table 4 provides the statistical data on the existing number of on-campus parking spaces and the number of spaces constructed within the last 10 years as reported by the surveyed universities. At the 95 percent confidence level, *t* tests indicated no significant difference between the parking capacity on urban and suburban campuses despite the larger motor vehicle usage on suburban campuses. Student *t* tests indicated no significant differences (at the 95 percent confidence level) between the parking capacity added to urban compared to suburban universities or to residential compared to commuter campuses over the last 10 years. It was taken into consideration that the discrepancies in enrollments of the schools may have affected these results, so the ratios of existing parking spaces to enrollment and of newly constructed parking spaces to enrollment were examined. Still, there are no significant differences (at the 95% level) between urban and suburban campuses in the either the existing or newly constructed parking ratios.

*Parking Response to Increasing Demand*

Table 5 shows how often particular forms of parking capacity were constructed on a university campus because of increasing transportation demand. The results reflect the desired land uses for university campuses, where parking is often not desired in the campus core. Almost 70 percent of respondents said that they never build surface lots in the campus interior, which shows the importance placed on this area for core academic and administrative functions and the lack of

available undeveloped land in this area. Surface lots in the campus periphery were the most commonly cited form of increased parking capacity.

*Parking Regulations and Management*

Parking regulation was a tool used by the vast majority of universities surveyed, with only one school indicating it did not attempt to regulate parking. Table 6 summarizes the methods employed by universities to regulate parking, with a large majority using both permits and meters. A few schools use cash-out programs, in which the university pays those who choose an alternative mode the same amount they would pay had they driven and parked a vehicle on campus. This arrangement eliminates the subsidy bias toward private vehicles and supports alternative modes fairly.

In addition to the data shown, several suburban campuses checked the "other" box, indicating programs such as fare-free transit and car/van pools as forms of parking regulation and technologies such as multi-space meters and in-vehicle meters. Florida State University in Tallahassee and Florida Atlantic University in Boca Raton have implemented a mandatory student transportation access fee, which is payable with tuition and includes a parking decal; the fee at Florida State University is based on the number of credits taken during the semester ($4.90 per credit hour). Some universities strictly limit the number of parking spaces available to students: for example, the University of Oregon noted in its survey response that "only 400 on-campus residents may get storage permits," and the University of Wisconsin has only 300 student parking spaces.

*Permit Pricing and Selling Practices*

Since most universities use some form of parking permit program, data on permit prices were collected from each respondent, with the results shown in Table 7. The "high-end costs" refer to the highest prices found for a permit on campus, typically for faculty/staff reserved spaces; "low-end costs" are the lowest permit prices, usually for remote student lots. Oakland University in Rochester Hills, Michigan, was the only respondent that does not charge for parking or attempt to regulate parking demand. Therefore, Oakland University was not included in the analysis of parking costs to avoid any bias that it might create in the calculations. Student *t* tests at the 95 percent confidence level indicated no significant difference in the high-end permit prices between urban and suburban campuses but did indicate a significant difference between the low-end prices. The lack of a significant difference between the high-end prices is a result of the large standard deviation for high-end prices. Low-end prices were relatively similar for a particular setting, but high-end prices showed considerable variability. Permit costs on urban campuses reflect the high-density development of such areas and the ability of the administration to balance high parking costs with the numerous other transportation options available to campus users (e.g., walking, transit).

Because faculty/staff and students have quite varied schedules, universities often oversell permits to optimize parking facility efficiency and revenue. *Overselling* is defined as the ratio of permits sold to the number of spaces available for a particular permit. Survey respondents were asked whether the parking department intentionally oversells student and faculty/staff permits, and if so, by how much; the results shown in Table 8 indicate that overselling is more common at residential than at commuter universities, where automobile use is higher for to/from campus

trips. However, commuter permits at residential schools are more likely to be oversold or to be oversold at a higher ratio than are on-campus resident vehicle permits. Two of the residential campuses that reported overselling commuter permits do not oversell on-campus resident permits for vehicle storage. Indiana University reported that "the student lots never fill up so we don't cap the sale of permits" which suggests that other campuses reporting unlimited permit sales may not have excessive student parking demand or that the permits are simply "hunting licenses" with no guarantee of a parking space. Overselling is a simple tactic to maximize revenue while optimizing the space used for parking, but the hunting license aspect it can induce is politically unpopular with drivers at some campuses.

*Spillover Parking*

Spillover parking refers to the parking of campus-associated vehicles in areas adjacent to the campus, e.g., curbside parking on neighboring streets. Spillover parking is frequently a source of "town-gown" tension and is often addressed from the municipal, rather than the university, side. Survey respondents were asked how the university and the local community had managed spillover parking and how successful these measures had been. Table 9 shows the combination of efforts that schools and local governments use to regulate spillover parking. By discouraging spillover parking, universities and local governments can indirectly encourage use of alternate modes by making free or low-cost parking more difficult to obtain.

The vast majority of survey respondents indicated that spillover parking was a problem on their campus. Two urban campuses reported a lack of success with using meters to regulate spillover parking, and a third campus was unsuccessful with municipal permits and 2-hour parking restrictions. However, Indiana University found municipal permits and zoning codes to be "very successful;" likewise, the suburban campuses of the University of Virginia, University of Florida, and University of California at Davis were "very successful" with municipal permits. The University of California at Irvine has very successfully used zoning codes that also prohibit on-street parking in the city. The remaining respondents reported being "somewhat successful" with their approaches. Therefore, the responses indicate that cooperation with the local community in developing municipal permits and zoning codes is the most effective way to manage spillover parking. It also appears to be a win-win situation for the campus and the community, as the campus does not have to enforce parking regulations in these areas and the municipality generates revenue from the sale of permits and from parking citations.

*Innovative Strategies*

By far the most common approaches to parking management on university campuses involved implementing on-campus parking regulations and methods to deal with spillover parking. The survey and the literature review revealed additional innovative approaches to campus parking management, as discussed here.

The University of California-Irvine and the University of California at Berkeley use stack parking to maximize the number of vehicles that can fit into a particular area. In stack parking, the driver parks the vehicle in the aisle of the structure/lot and leaves the keys with the parking attendant so that the vehicle may be moved in the event it is blocking another vehicle that needs to be moved.

Like most schools, the University of Michigan at Ann Arbor heavily discourages students from bringing a vehicle to campus. There is no storage parking on campus, and no vehicle may be parked on campus for more than 48 hours, which probably makes having a vehicle on campus for residents more of an inconvenience than a necessity. In addition, freshmen and sophomores are not eligible for parking permits.

Several schools have implemented measures to accommodate the occasional parker without requiring the purchase of a full parking permit. The University of Michigan also has scratch-off cards that cost $35 for a 10-pack. Each scratch unit is valid for 1 day of parking, and the user scratches the card to reveal the appropriate date and displays the card in the vehicle's windshield. Other schools such as Utah State University have similar daily permits in the form of punch cards. Day-to-day permits such as this help prevent the "all you can eat" syndrome that is often enabled by long-term permits. If a driver has already paid for a full parking permit, he or she has no incentive not to drive and park every day rather than occasionally using alternative modes.

Some universities promote formal sharing of assigned parking spaces. Texas Tech University allows employees to share a reserved parking space provided each person signs a share space agreement and completes a vehicle registration form. Only one of the vehicles under that registration may be parked on campus at a time. The university also offers transferable and non-transferable permits.

In some cases, preferential status is given to carpools. The University of Florida in Gainesville allows drivers of three-person carpools to park free; student decal eligibility is based on residence location and number of credit hours, and the decals are available as annual, monthly, and weekly permits.

In several cases, parking permits are restricted to people who do not have a viable alternative mode of transportation to the university. Northwestern University and the University of California-Irvine have implemented "walking zones" that surround the campus and determine eligibility for parking permits and/or alternative transportation programs: for example, if a faculty/staff member or student lives within the "walking zone," he or she is ineligible for a permit.

A number of universities are implementing several advanced technologies to assist in parking management. The University of Wisconsin at Madison has a flex parking program that helps reduce parking demand and consequently the need for new and expensive parking facilities. Essentially a "pay-as-you-park" program, a meter is installed in the user's vehicle and is activated with a "smart card" to record parking activity. The university reports "a reduction in days parked through the [2-year long] pilot" program. The State of Wisconsin also has a state commuter benefits program that assists with the flex parking system by allowing users to pay for smart cards before taxes. The card acts as a debit card from which parking charges are deducted with each use. The in-vehicle meter must be visible from outside the car so that parking enforcement officers can ensure that the meter has been activated; they will issue a citation otherwise.

The University of Missouri and University of Arkansas use CashKey technology for their meters. The cash key is programmed at the time of purchase ($10 to $15 initial deposit required) for the desired amount ($25 minimum) and is inserted into the meter to deduct money from the user's account, thereby eliminating the need to carry coins to feed the meter. The user purchases parking time in $0.25 increments each time CashKey is inserted into the meter, so the key is inserted multiple times until the desired amount of time is reached. The user returns to the

parking office to add value to CashKey. CashKey can also be used in combination with coins at the meter.

The University of Arkansas uses debit cards at multiple space meters. Debit cards can be purchased from the parking department and can be inserted into the meter to add value by depositing money. There is a single meter for several spaces, and the user inserts the debit card, identifies the number of the space he or she is parked in, and purchases parking time in 30-minute increments. The meter displays the balance of the card and prints a receipt to indicate the expiration time of the parking, the space number, the amount paid, and the time of purchase. Texas Tech University also uses multiple space meters in a system called "Park and Pay."

## SUMMARY OF FINDINGS

### Trends in University Parking Management

The survey and literature review revealed several major findings related to how universities manage parking. Trends in mode split, parking construction, and parking management and regulation were identified:

- *Automobiles have a significantly higher usage rate on commuter campuses than on residential campuses and on suburban campuses than on urban campuses.* These findings are intuitive given the relative availability and cost of parking at these campuses.

- *New surface lots are rarely constructed in the campus interior, and most parking capacity expansions occur in the form of surface lots on the campus perimeter.* These trends reflect the desire of most campuses to have a pedestrian-oriented core; the desire to have core academic and administrative buildings, rather than parking, in the central campus; and the overall relative lack of available space to construct parking in the central campus.

- *The majority of respondent universities regulate on-campus parking with permits and meters.*

- *Although high-end costs were similar between urban and rural campuses, low-end parking costs were significantly higher on urban campuses.* This is likely due to the relative availability of parking on those campuses.

- *Spillover parking is often a significant problem on urban and suburban campuses. Municipal permits, meters, and zoning ordinances were often used to address these issues.*

### Lessons Learned From University Approaches

Several policies have been implemented by universities to help manage parking demand. Some universities have implemented restrictive parking policies, such as prohibiting undergraduates from bringing vehicles to campus or making residents within a particular radius of the campus ineligible for a parking permit. Short-term parking options, such as hourly or daily permits, and a guaranteed ride home program have also been used to fill a niche for the campus user who

needs to drive to school occasionally but ends up driving everyday because he or she paid for a semester or annual permit or may need a vehicle in the event of an emergency.

Universities have also turned to advanced technology to help manage parking demand. A common problem on university campuses is that a parking permit provides an unlimited license to park an automobile on campus. As a result, permit holders often have little incentive to use alternate modes. Advanced technology has been used by a number of universities to create a mechanism for occasional parking on campus. This allows the user to have a vehicle available when needed at a cost lower than that of a full-time permit, thereby creating opportunities to charge more precisely based on usage and create more opportunity for use of alternate modes.

### Use of Results in Non-University Settings

Several of the findings of this study could be easily expanded to non-campus applications. The concept of municipal parking permits could be adapted for any application where parking for a large traffic generator spills out onto neighboring residential streets. Likewise, short-term parking permits or "pay as you park" programs may be more effective at decreasing parking demand and increasing the use of alternatives than long-term (i.e., annual or monthly) permits. Short-term parking also makes the costs of driving more visible. In the case of long-term parking permits, there is no incentive for the driver to use an alternate mode. Further, short-term parking is politically friendly, relatively easy to implement, and satisfies a market niche that is often neglected. This could easily be adapted to municipal or business parking in major urban areas.

## CONCLUSIONS AND FUTURE RESEARCH

Universities have been forced to develop innovative parking management strategies to balance the accessibility and mobility needs of the university environment with the desired land uses of an educational institution. Survey results indicated that urban campuses have significantly lower motor vehicle usage for trips to and from campus as do suburban campuses. It appears that the reasons for this difference include 1) the more extensive transit systems in place in urban areas; 2) the lack of available land for parking and high parking costs typical of urban areas; 3) the wider range of residential choices (and consequently commuting distances) available in high-density urban areas. Therefore, universities wanting to devote campus land to academic facilities rather than parking lots may want to direct their resources towards the transportation aspects of the surrounding area rather than providing additional on-campus housing to students. Parking management is just one component of a wider transportation demand management plan that is a holistic system of transit programs, car and vanpooling incentives, bicycling networks, residential policies, and more. The parking management plan, however, serves an important role in providing access to a university while creating a framework that could help reduce the dominance of the automobile in the university setting.

Some research questions still need to be answered. In most cases, universities had little quantitative data on how the techniques they implemented affected mode split. More research is needed to understand how these methods really cause drivers to change their mode choice. The lack of this type of quantitative data could limit the extent to which these methods are extended to other locations. Qualitative results from the survey do suggest that they are beneficial, but more investigation is needed before their merits are fully clear.

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**LIST OF TABLES**

**TABLE 1 Universities Responding to Survey**

| Setting | Institution | Enrollment | City | Population (2000) | Residential (R) or Commuter (C) |
|---|---|---|---|---|---|
| Urban | University of Wisconsin | 40,922 | Madison | 208,054 | R |
| | Indiana University | 37,963 | Bloomington | 69,291 | R |
| | Florida State University | 34,982 | Tallahassee | 150,624 | R |
| | Iowa State University | 27,823 | Ames | 50,731 | R |
| | Texas Tech University | 25,573 | Lubbock | 199,564 | R |
| | Harvard University | 24,474 | Cambridge, Mass. | 101,355 | R |
| | University of Nebraska | 22,764 | Lincoln | 225,581 | R |
| | East Carolina University | 19,412 | Greenville, N.C. | 60,476 | R |
| | University of Oregon | 18,956 | Eugene | 137,893 | R |
| | Syracuse University | 18,072 | Syracuse, N.Y. | 147,306 | R |
| | Marshall University | 16,036 | Huntington, W.V. | 51,475 | C |
| | University of Arkansas | 15,752 | Fayetteville | 58,047 | R |
| | University of Louisiana | 15,489 | Lafayette | 110,257 | C |
| Suburban | University of Florida | 46,515 | Gainesville | 95,447 | R |
| | Michigan State University | 44,227 | East Lansing | 46,525 | R |
| | Purdue University | 39,882 | West Lafayette, Ind. | 85,175 | R |
| | University of Michigan | 38,248 | Ann Arbor | 114,024 | R |
| | Brigham Young University | 32,771 | Provo, Utah | 105,166 | R |
| | Colorado State University | 28,103 | Fort Collins | 118,652 | R |
| | University of North Texas | 27,858 | Denton | 80,537 | C |
| | University of California-Davis | 27,292 | Davis | 60,308 | R |
| | University of Oklahoma | 25,104 | Norman | 95,694 | C |
| | Florida Atlantic University | 23,345 | Boca Raton | 74,764 | C |
| | University of Virginia | 22,739 | Charlottesville | 45,049 | R |
| | University of California-Irvine | 21,885 | Irvine | 143,072 | R |
| | University of California-Santa Barbara | 20,373 | Santa Barbara | 92,325 | R |
| | University of Alabama | 19,130 | Tuscaloosa | 77,906 | R |
| | Southwest Missouri State University | 18,252 | Springfield | 151,580 | C |
| | Northwestern University | 17,000 | Evanston, Ill. | 74,329 | R |
| | Western Kentucky University | 16,552 | Bowling Green | 49,296 | C |
| | Oakland University | 15,875 | Rochester Hills, Mich. | 68,825 | C |
| | New Mexico State University | 15,224 | Las Cruces | 74,276 | C |
| Rural | University of Missouri | 23,667 | Columbia | 84,531 | R |
| | Utah State University | 23,001 | Logan | 42,670 | R |

**TABLE 2 Breakdown of Sample Group**

| Setting | Classification | No. Respondents | % Sample |
|---|---|---|---|
| Surrounding land use | Urban | 13 (2)[a] | 38 |
| | Suburban | 19 (7) | 56 |
| | Rural | 2 (0) | 6 |
| Campus type | Commuter | 9 | 27 |
| | Residential | 25 | 73 |
| Region | West | 7 | 21 |
| | Southwest | 5 | 15 |
| | South | 8 | 24 |
| | Midwest | 12 | 35 |
| | New England | 1 | 3 |
| | Mid-Atlantic | 1 | 3 |

[a]Number in parentheses denotes number of universities classified as "commuter" for each category.

**TABLE 3 Motor Vehicle Usage (% of all trips)**

| Destination | Classification | N | Mean | Median | Standard Deviation |
|---|---|---|---|---|---|
| To/from campus | Urban | 9 | 48 | 45 | 2.2 |
| | Suburban | 14 | 75 | 76 | 1.9 |
| | Residential | 14 | 58 | 54 | 2.3 |
| | Commuter | 9 | 74 | 75 | 2.2 |
| Within campus | Urban | 5 | 10 | 10 | 0.6 |
| | Suburban | 9 | 27 | 30 | 2.1 |
| | Residential | 5 | 15 | 10 | 1.2 |
| | Commuter | 9 | 24 | 20 | 2.2 |

**TABLE 4 Existing Parking Spaces and Spaces Constructed in Last 10 Years**

| Location | N | Existing Parking Spaces | | | Parking Constructed in Last 10 Years | | |
|---|---|---|---|---|---|---|---|
| | | Mean | Minimum | Maximum | Mean | Minimum | Maximum |
| Urban | 13 | 10,485 | 3,300 | 19,000 | 1,921 | 100 | 4,000 |
| Suburban | 18 | 12,525 | 3,800 | 25,000 | 2,010 | 0 | 5,000 |
| Rural | 2 | 15,200 | 7,400 | 23,000 | 7,675 | 350 | 15,000 |
| Residential | 25 | 13,239 | 3,300 | 25,000 | 2,465 | 0 | 15,000 |
| Commuter | 8 | 7,648 | 3,300 | 13,000 | 2,041 | 447 | 5,000 |

**TABLE 5 Responses to Increasing Transportation Demand (%)**

| Response | Frequently | Occasionally | Never |
|---|---|---|---|
| Build more surface lots in campus interior | 6.1 | 24.2 | 69.7 |
| Build more parking structures in campus interior | 16.7 | 53.3 | 30.0 |
| Build more surface lots on campus periphery | 32.4 | 52.9 | 14.7 |
| Build more parking structures on campus periphery | 12.9 | 45.2 | 41.9 |

**TABLE 6 Parking Regulations on University Campuses**

| Measure | % (No.) Respondents | |
|---|---|---|
| | Suburban | Urban |
| Parking not regulated | 5.6 (1) | 0 |
| Permits only | 11.1 (2) | 7.7 (1) |
| Permits and meters | 44.4 (8) | 69.2 (9) |
| Permits and cash-out program | 5.6 (1) | 0 |
| Permits, meters, and cash-out program | 5.6 (1) | 7.7 (1) |
| Permits, meters, and prohibitive policy for freshmen | 5.6 (1) | 7.7 (1) |
| Permits, meters, and eligibility based on residential location | 5.6 (1) | 7.7 (1) |
| Permits, meters, cash-out program, and prohibitive policy for freshmen | 16.7 (3) | 0 |

**TABLE 7 Range of Parking Permit Costs on Urban (n = 12) and Suburban (n = 16) Campuses ($)**

| Parameter | High-End Parking Costs | | Low-End Parking Costs | |
|---|---|---|---|---|
| | Urban | Suburban | Urban | Suburban |
| Mean | 627.48 | 495.31 | 135.72 | 84.44 |
| Median | 607.00 | 420.00 | 110.00 | 62.50 |
| Standard Deviation | 448.25 | 305.68 | 143.87 | 61.26 |
| Maximum | 1,620.00 | 1,013.00 | 560.00 | 252.00 |
| Minimum | 126.96 | 85.00 | 26.00 | Free |

**TABLE 8 Mean Oversell Ratios of Campuses That Intentionally Oversell Permits**

| | Residential Campuses | | Commuter Campuses | |
|---|---|---|---|---|
| **Permit Type** | **% Campuses That Intentionally Oversell** | **Mean Oversell Ratio (permits:spaces)** | **% Campuses That Intentionally Oversell** | **Mean Oversell Ratio (permits:spaces)** |
| Faculty/ Staff | 76 | 1.26:1 (+6 campuses that do not limit permit sales) | 43 | 1.4:1 |
| Student | 64 | 1.90:1 (+8 campuses that do not limit permit sales) | 50 | 1.4:1 |

**TABLE 9 Methods Used to Deal with Spillover Parking**

| | % (No.) Respondents | |
|---|---|---|
| **Measure** | **Suburban** | **Urban** |
| Not a problem | 11.1 (2) | 0 |
| Is a problem, but no attempt has been made | 33.3 (6) | 23.1 (3) |
| Meters only | 5.6 (1) | 23.1 (3) |
| Zoning codes only | 16.7 (3) | 0 |
| Municipal permits only | 22.2 (4) | 0 |
| Municipal permits and meters | 5.6 (1) | 0 |
| 2-hr parking restrictions | 0 | 7.7 (1) |
| On-street parking removal by petition of residents | 5.6 (1) | 0 |
| Municipal permits and 2-hr parking restrictions | 0 | 15.4 (2) |
| Municipal permits and zoning codes | 0 | 7.7 (1) |
| Meters and zoning codes | 0 | 7.7 (1) |
| Municipal permits, meters, and zoning codes | 0 | 15.4 (2) |