2016

CITYWIDE STRATEGY FOR PARKING MANAGEMENT

Presented by the City of Sarasota,

Parking Division, in cooperation with The

Parking Advisory Committee

City of Sarasota, 2016

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INTRODUCTION

Parking plays an important role in preserving vibrant business districts, healthy communities, and improves satisfaction levels by those visiting the City. The plan presented before you is intended to provide the City Commission with a high level review, and forward thinking ideas, about how the City's Parking Management program may move forward and cohesivly integrate with the ciity's services offered to the community.

We believe the idealogy outlined in this document can transform the current program from one of incidental necessity, to a program of services that benefit the community as a whole. A virtual paradigam shift, this new plan promotes the operating philosophy that parking serves the community's needs and is cognizant of the individuality each parking district commands. This strategy is only the beginning steps that seeks the Commission's understanding and approval of principles that will be further detailed and vetted with the community. The evolving program creates opporunmities to better align parking and economic development. It delivers a more comprehensive and susustainble approach to community access strategies, and establishes more collarborative relationships with associated agencies and community partners.

The City of Sarasota is a unique and culturarlly blended community that prides itself in carefully addressing changes - that make sense. When it comes to making changes in the parking system, and understanding how the program may impact the community, the City is not unlike many other's of similar size from across the country.

A recent survey commissoned by the International Parking Institute (IPI), performed by Penton Research and analysis by the Market Research Bureau, found that among municipal parking departments, a combination of interesting data that is very relfective of our own community. The survey measured their knowledge base, attitudes and needs with regard to parking among government oofficials. Of the municipalities that responded to the survey 81.4% consisted of cities with population of less than 149,999 residents. Moreover, of this total, 63.6% of the responses were derived by cities of less than 50,000 residents, suggesting the results of this survey positions the City of Sarasota within the larger proportion of respondents further delinating our similarity of issues with other municipalities of our size.

Among various questions, the survey asked:

> *What is the most important reasons that you might consider reviewing/expanding/updating your current parking program?*

Improve business district customer access	39.1%
Increase citizen satisfaction	37.5%
Improve visitor/tourism access	27.8%
Boost economic development	22.7%
Increase revenue	21.1%
Improve community	19.7%
Encourage development	17.4%
Manage congestion	13.0%
Enhance security	12.4%
Better use of urban land	7.7%
Improve mobility	7.4%
Increase sustainability	7.4%
Manage/improve data/analytics	6.4%
Desire to improve transportation mode split	3.7%
Ensure compliance with environmental regulations	2.7%
Other	9.4%

Percentage may reflect multiple answers

Which of these parking or traffic-related trends are having the most impact on your government?

Need for improved customer service	30.8%
Collaboration between parking, transportation, and decision makers	21.0%
Demand for greater parking revenue	18.0%
More Public-Private partnerships	13.4%
Need for improved visual aesthetics of parking facilities	13.1%
Demand for cashless or electronic payment	11.5%
Demand for green/sustainable solutions	10.2%
Need to improve facility security	8.9%
Alternate use of parking facilities during off-peak hours	7.9%
Shortage of qualified employees	5.6%
Need to accommodate electric car charging stations	5.2%
Move toward innovative technologies to improve entrance/exit gate automation	4.3%
Real-time communication of pricing and availability to a mobile device	3.6%
Use of wireless sensing devices for traffic management	3.6%
Demand for “visual dashboard” parking info systems	.7%
Demand for robotic/automated parking	.3%
None of these	29.5%
Other	6.6%

Which societal changes are having the most significant influence on parking in your city or county?

Desire for livable, walkable, communities	47.2%
Traffic congestion	36.2%
Aging population	30.3%
Concerns about safety	24.5%
Gasoline prices	17.6%
Desire for more aesthetic design	17.2%
Use of bicycles for commuting and build-out of on-street bicycle networks	15.5%
Focus on environment/sustainability	14.5%
Increase in mass transit use	11.7%
Migration to urban areas	8.6%
Reduced vehicle ownership patterns in younger generations	2.8%
Alternative fuel vehicles	2.1%
Other	12.4%

A cursory review of this data provides a glimpse of the wide-ranging elements required in managing a municipal parking system. Each city has its own unique attributes that affect these categories differently, and there were many individual responses that can be read more thoroughly in the Walker Parking Study. However, a common theme among the cities responses to these questions, were:

- Improve customer satisfaction
- Enhance business district customer access
- Make city more livable and walkable
- Enhance visitor/tourism experience

Each city recognized most importantly the need to fashion downtown parking districts more desirably for the users. To remain viable and align with these common ideas, municipalities and parking programs need to be focused on implementing programs that positively affect the business community and entice visitors, residents, and commuters to enjoy and walk more. This review proposes that the City can align with business practices and still apply unique approaches to solving our local parking issues.

Still, there are questions, which must be addressed if the City is to adopt a new parking management plan:

1. Will the community identify with the common objectives outlined in this document and recognize they hold centrally core importance?
2. How will the objectives, ideas and priorities of the community coalesce with the programs herein, and then establish criterion that enables us to move forward?
3. How do we recognize, accept, utilize and apply measured steps to ensure use of the parking and transportation industry's best practices?
4. Can our community be resolute in direction by accepting the principles used by other successfully demonstrated parking programs across Florida and the world?

This strategic plan report will provide the information necessary for your decision, and ultimately actions that can lead to new possibilities in helping manage the downtown parking districts in the City of Sarasota. The report will provide historic perspective, informative data, successful examples and references of other community plans similar to that of Sarasota, and offer preliminary objectives that will move a complimentary approach to planning the future of the parking program for the City of Sarasota.

Politics ain't worrying this country one-tenth as much as where to find a parking space.
Will Rogers

WHY DOES PARKING MATTER?

Parking plays an integral role in many ways that are not considered. Parking becomes a part of every community. How we employ parking and its methodologies, affects the basic citizenry experience and satisfaction level within a community or downtown. It is because of this we ask questions and seek answers to understand the needs of each parking district. Parking addresses a broad range of parking elements that can positively impact a community. Using proven strategies and valued management methodologies, strong organization interface, effective communications, technology, skilled operations, and planning, the potential negative perceptions that surround the parking environment can be minimized.

Parking matters to the community because good parking management mitigates congestion, frustration, sprawl and pollution from vehicles. When parking resources are properly managed it results in better parking space accessibility, less driving around to look for a space, causing fewer carbon footprints and less need to expand parking. Managing parking resources is an authentic life issue that affects everyone. Resources are in high demand and quality-parking management helps the community build, grow and thrive. Parking helps to build more sustainable systems for motorists, building smart transportation solutions simply make life easier for motorists, cycling, commuters, and environmentalist alike.

With the right approach and a strong strategic plan, parking can be viewed as an integral player that helps to maintain economic vibrancy, adds to the health of the economic community, and helps balance the community's needs for transportation, accessibility, mobility, and sustainability.

PARKING AFFECTS:

- **Urban Design and Community Livability** – Parking is often the largest single land use in a downtown or campus environment. Integrating structured parking with mixed-use developments, transit oriented developments and comprehensive access management programs are key components to enhanced urban design and livable communities.

- **The Environment** – It is estimated that 32% of country's carbon footprint is related to transportation, of which automobile usage/parking is a large component. Through "right-sizing" parking supply, providing a range of convenient and affordable commute options and adopting effective parking planning and management best practices we can significantly reduce our environmental impacts while saving fuel and reducing congestion.

- **Community Finances** – Parking represents significant capital investments for Cities, campuses, event venues, private developments, etc. In some communities, investment in parking development is seen as "necessary evil", while in others, where the proper system organization and financing structures have been applied, the parking investments are paying big dividends in terms of parking being a self-funding enterprise fund that also generates significant community reinvestment.

- **Development** – Parking is often seen as the single biggest reason why development projects "won't pencil". However, there are many good examples where parking development is an important element in an integrated community development program.

- **Business Success and Economic Vitality** – Business friendly parking management provides clean, safe, convenient and affordable parking

- **People** – Visualize how many cars are on the freeways surface streets during rush hour. Guess what, that is only a partial sample of the cars parked in any given community. Many of those cars will have more than one occupant. Each vehicle occupant will have a parking experience that day. Think of all the "customer touches" that equals over a year. What if all those "touches" were a negative experience?

PARKING IS:

- **Personal** – It impacts people in very direct ways – budget, scheduling, personal safety, etc.

- **Complex** – Simplistic approaches to parking rarely work. Parking is planning, financing, management, maintenance, technology, enforcement, customer service, communications, human resources, revenue control, safety, security, economic development… just to name a few.

- **Technical** - Keeping up with the pace of technological change is both challenging and exciting.

- **Infrastructure** – As long as we live in an automobile dominated society, parking will be essential public and private infrastructure.

- **Management** – Given the significant capital investment and the importance of parking resources to the businesses they serve, effective parking management is

essential to leveraging that investment for the benefit of the community it serves. A variety of parking options must be provided to meet the diverse needs of business district. Convenient, on-street customer parking requires different management techniques that longer-term employee parking, Residential, retail, restaurant, professional services all have different and sometimes competing needs.

- **Part of the Larger Transportation Equation** – We should not lose sight of the fact that parking is but one important element in a larger transportation and access system.

- **Never Free** – It is important to realize that parking is never free. Someone somewhere is paying for it through property taxes, maintenance costs, utility costs, retail prices, lease or property rents, etc. Even suburban malls where parking is perceived be free by the general public, charge for the cost of parking through the merchant leases, which costs is then passed on to each consumer in the products that are purchased.

Source: International Parking Institute

– Don Shoup, The High Cost of Free Parking.

> *Free parking helps explain the enormous demand for automobile terminal capacity. By shifting the cost of parking from drivers to everyone else, off street parking requirements provide huge subsidy's to motorist and thus increase demand for cars, parking spaces and vehicle travel.*

"Parking is a destiny" – Adres Duany

A Historical Review

Meter parking systems were developed in 1935 as a means to open up clogged parking spaces and reduce traffic congestion. On January 6, 1942, the City of Sarasota installed its first 160 meters. In the first month or so, the City earned $1,809.01 (1 penny for 12 minutes). Due to complaints by local merchants, the City withdrew the meters on March 19, 1942. Mr. B.C. Kicklighter of the Retail Merchants Association was quoted in saying, "When the city grows to such an extent that parking meters will be advantageous, the merchants will be in favor of them." It was only about four years later that the need to manage street parking and congestion was again recognized by the City and the Merchant's Association. On December 16, 1946, City Manager Ross Windom recommend them to the City Commission with the support of the Sarasota Retail Merchants Association, which this time unanimously endorsed the plan. The plan called for about 250 meter spaces, which ultimately grew to about 600 meters before the program was again cancelled in 1967.

Twenty-one years of successful parking meter operations helped to manage the city's parking and traffic growth during the "boom" days of the 1950's and early 60's. Fast forward to the first decade of 2000, the City embarked again on developing concrete plans to ensure a level of sustainability using smart growth principles. As part of the City of Sarasota's Master Planning program in 2006, a parking study was performed to determine the level of parking demand, and identify the best approach to managing parking in the future. The Study, performed by Tindale Oliver & Associates, Inc., 2005, outlined the shortage of parking, a management program, and identified the effects of the shortage of parking. The City Commission approved continuation of the Master Plan in 2010.

The Master Plan recommended the establishment of a separate Parking Division, or Department, to be managed by an experienced and seasoned parking professional. The plan called for the new parking director to manage the integration of industry standards and the full implementation of a pay for parking system, on-street meters and parking garages. While the City embarked on the plan to purchase meters and build a parking garage, the professional parking manager was hired August 2011.

In spring of 2011, the City launched a concerted effort to implement paid parking by installing both pay by space and single space meters. The initial plan called for implementation in the "prime" parking areas of town. Once it began, the program was extended beyond the initially defined area, prompting significant consternation by a few merchants. The program operated for approximately forty-five (45) days when the negative community and merchant feedback was so extensive that the City Commission placed a stop on the system and called for reconsideration of the program footprint and pricing structure. October 2011, the program was reactivated with a modified pricing structure and accommodated a smaller geographical footprint that also accounted for in season, high demand pricing, and off-season, low demand pricing.

The Parking Division performed surveys with the users that indicated approximately 70% of patrons accepted the program as "good, or better". Payment compliance was high at the meters. Utilization studies indicated there was heavy usage in prime parking areas, averaging greater than 95% occupancy in peak periods and locations. Despite the modifications that were made to improve the program, problems still existed and feedback indicated the meters were difficult to use. These studies sparked more debate about the perceived impact versus real impact the meter program had on customer activity in the downtown. Along with the use of the meter itself, it was this issue that presented the most challenge for the merchants, which caused a reverberation of the public's criticism of the equipment and system.

These factors, along with the efforts by a small contingent of merchants, ultimately convinced the City Commission on March 5, 2012, to repeal the paid parking program. The Commission further instructed the Parking Division to cancel all other programs that require payment for parking, including employee-parking permits, until a more in depth review of the parking program performed. Acknowledging the concern and confusion over the on and off again parking program, the City Commission subsequently directed the Parking Division to begin the development of a citywide strategic parking plan.

The Parking Division established a "stop the bleeding" approach in managing the immediate concerns. Time restrictions, previously removed in lieu of meters, were returned to on street parking spaces to prevent undesired and lengthy turnover of spaces. The parking garage and surface lots were set with no time restrictions. Eliminating time restrictions within these areas provided incentive for employees and the public to park in areas without the need to relocate their vehicle, and thereby increase the effective supply of available on street parking.

With the immediate concerns addressed, there still was a parking resource problem. Re-deploying time restrictions in these areas helped to mitigate the concerns of turnover to a small degree. Yet, speak with store clerks and owners, they will tell you how customers complain about difficulty locating spaces. Speak with parking users, and they will tell you they do not know where to find parking, or that they just go to the heart of their destination first to take a chance at finding a parking spot.

Soon, employees began to park more frequently in the prime parking spots. The employee "shuffle" to find another space was becoming obvious. The Parking Division commenced selling heavily discounted parking permits to employees working in the downtown that allowed parking in convenient off street facilities and that permitted them to exceed the posted time limits. Nevertheless, where do you see their cars and parking permits? They are seen on street in prime spaces, and those are only the employees that have purchased a permit that we can see. Where are the majority of the other employees?

Value of a parking space is high, but the recognition of its value is low - and perhaps misunderstood by most. Parking resources are in desperate need of special program management. The experts in transportation, urban planning, and parking have studied the idea of creating endless supplies of parking. They all agree that an expectation where supply is simply increased as much as physically possible, whenever needed, is not a sustainable ideology.

Whether in off season or in season, parking utilization surveys performed by staff indicate occupancy rates above 85% in prime parking areas between noon and 6 p.m. throughout all of the parking districts. In prime shopping and dining districts, space utilization rates soar after 5 p.m. to 95-100%, making locating a convenient parking space nearly impossible. The Bayfront Parking lots are highly congested, and heavily used on weekends and holidays. Yet, to date there are no plans to improve this condition and relieve the park of this congestion problems. The Southside Village, St. Armand's and Lido Key have very high parking usage and are troubled because these areas are seemingly "landlocked" and inhibit the ability to grow beyond their current status because of lack of parking turnover, space capacity, or lackluster alternative transportation modes. This situation is greatly exacerbated during special events as they cause massive flow of parking demand, especially when it happens at the aforementioned locations. These events create major inconveniences to residents, customers, and merchants, often violating our city ordinances and state laws, increasing the odds for safety infractions and worse, a major catastrophe.

Now, more than ever before, as the City moves out of the Great Recession and into perhaps one of its greatest economic growth periods in modern times, the City needs to recognize how the parking demand impacts the vibrancy of business. The potential result of taking no action to effectively manage parking resources could drive away visitors, long standing clients, and inhibit the growth and momentum within each parking district.

The Parking Advisory Committee (PAC)

After the paid parking program was repealed on March 5, 2012, the City Commission requested the Parking Division provide some insight on how to move forward. The Parking Division developed two recommendations that were subsequently endorsed by the City Commission. The first recommendation was to approve a parking consultant study that established a baseline of data reflecting on the state of City's parking capacity, utilization and turnover citywide. The data from the study would help the Parking Division and the Parking Advisory Committee reflect on future planning for the citywide parking program. The second recommendation was to develop an advisory panel that would be comprised of leaders within the parking districts-from around the city. The commission of the panel was to assist the Parking Manager and explore why and how the prior parking plan did not meet with adequate levels of acceptance to continue, and to develop a method for navigating through future parking management requirements.

The PAC committee members were canvassed from community leaders, individuals with experience in the City of Sarasota that possessed a degree of understanding and connection within the community so that the best interest of the City remain in focus. The intended make up was to enlist up to nine (9) members from each primary parking district. Members were selected who served on the Coalition of City Neighborhood Associations (CCNA), the Downtown Sarasota Alliance (DSA), the Downtown Improvement District (DID), and the Business Improvement District of St. Armand's (BID), and business leaders from other business districts impacted by parking issues. The makeup of the committee has changed slightly during its existence, but the genetic makeup and purpose has remained constant. Moreover, because the members are from the surrounding communities and associations, their ability to cascade the topics of discussion with their constituents and then return and relay feedback, makes their assessment of the issues highly credible and valuable when advising the Parking Division on how to proceed with the a strategic plan.

The PAC has been instrumental in the review of the prior paid parking program and has focused on understanding the issues surrounding its demise. In addition, the PAC reviews current parking program activities and objectives, provides input in operational changes, and are developing the foundation of the future parking program, vis a' vis the strategic plan.

Developing a Vision, Mission & Guiding Principles

The Parking Advisory Committee was formalized to help navigate the subsequent issues surrounding the on again and off again parking program in the City. The formation of the Parking Advisory Committee (PAC) would become paramount in determining not only how to move forward with a quality parking program, but also in determining what went wrong with the process utilized to implement parking in Sarasota in 2011, and how those issues could be prevented in the future.

The committee soon recognized a fundamental missing link in the development and ongoing management of the program. The program was void of definitive purpose and function. Without a consistent message articulating both externally and internally, about why the parking program exists, it would continue aimlessly and fail to receive adequate support. This missing link caused a "disconnect" within the community affecting the Parking Division's ability to sustain industry standard practices. This disconnect occurred:

- between merchants and users
- the public using the system
- how employees perceived and publicly expressed satisfaction
- provided no sense of direction for policy makers as they received feedback
- without strong guidelines and reason, directing and sustaining a long term program has no basis for its action.

Before development of a Vision and Mission statement, an analysis of the City of Sarasota's program strengths, weakness, opportunities and potential threats (SWOT) was performed by the PAC. Performing a SWOT analysis allowed the PAC to expand on issues surrounding the previous attempt to implement paid parking, to identify concepts that would provide value to the community and any future program, and form value added judgments about where the parking program should focus its interest.

The SWOT analysis revealed various issues to each member of the committee. The most frequently phrased responses included:

- Strength - sizable parking garage, walkable community, unique parking districts, professional parking manager.
- Weakness – funding, sustainability, lacking use of "standards", citations only substantial revenue source, little incentive to park off street and thus preserve spaces for general public access

- Opportunities – Still discussing paid parking as a means to manage, address employee-parking needs, improve perception of parking division.
- Threats – loss of business due to time restrictions, operating in "silo" effect, parking perception, mall traffic.

Committee Timeline of Tasks

Collectively, the committee used the SWOT analysis discussion as a means to understand the important role parking plays in the community. They recognized the significant effect parking creates on businesses, employees, visitors, future economic development, transportation, environment, tourism, and more. The analysis discovered that because the impact of parking is so very widespread on a community, any new parking plan would have to involve the fundamental business concepts that, not only respects but also works closely with the local merchants and residents. This notion suggests that program development should respond intelligently to the needs of each district through proper evaluation of the individually defined issues.

Progression of a Vision Statement – the aspirations of an organization

The Parking Advisory Committee discussed the vision statement concepts. They discovered in the prior program and SWOT analysis, a common perception that there were too many components in the previous meter program making it difficult to understand. Collectively the committee agreed the Vision statement should remain simple, to the point, easily envisioned and applied.

The committee's discussion centered on the need to create a sustainable operating system that abolishes dependence on the general fund subsidies. It desires to develop successful programs that organically continue to benefit the overall system. The committee also collectively agreed there is high value placed on operating a safe parking program, and in supporting the concepts of sustainability. The committee also held firm in the idea that central to every program consideration should be the use of metrics, facts, and using an intelligent approach to decision making. In essence, the plan was to intertwine the concepts of safety, sustainability and smart decision making. The committee decided a simple vision/message would serve best. A simple vision that could be easily remembered, and comprised of those three themes, imparts the right message.

The Vision of the Parking Division and Parking Management Program …

Smart, Safe, Sustainable

Parking Mission Statement – the purpose of existence

The Mission statement was developed in a manner to support the Vision of Smart, Safe, and Sustainability. The Vision statement reflects the notion and interest of the program to work for the benefit of customers and not just the city organization. Without parking customers, there is no program. To support the Vision precepts, the PAC determined that customer service is the foundation for operating. Further, the PAC recognized that parking programs affect a wide range of services and organization within the community. To that end, it became apparent that a multilayered mission station would more effectively project the ideology under development. Therefore, the Parking Mission is three-fold:

- ***To satisfy customers by making the system easy to use, and trouble free.***
- ***To create safe parking environments for users through well lighted, clean, and reliable operations.***
- ***To promote citywide economic growth within the parking districts.***

5 Five Guiding Principles – a credo and foundation for planning and decision-making

The PAC had embarked on the development of a Vision and Mission statement but required actionable reasons for change and analysis. While in this process, they simultaneously explored other successful parking management programs and identified common elements of good parking program management. From that discussion, a list of Guiding Principles were developed that identified why and how parking programs could best function to support the Vision and Mission statements.

Other successful parking programs from across the country, and in our own backyard, operate using defined principles of business. These principles help to tell us how and why to apply decision-making and creates a bedrock for consistent and sensible action planning.

Guiding Principle 1 – Supports the development of economic vitality and vibrant street life in our commercial and mixed-use neighborhoods by addressing each category of parking customer.

- Respect the need for premium-high demand parking, and low turnover parking spaces
- A portion of revenue is returned to the district for improvements
- Convenient parking, easily accessible
- Simple, clear information is conveyed about parking
- Good customer service is provided
- Provide incentives that encourage appropriate parking behaviors, rather than punish unfavorable actions

Guiding Principle 2 – Supports the maintenance of public safety

- Provide well-lit and clean operations
- Rules that make sense and encourage safety
- Good signage and pavement markings
- Reduces congestion, frustration, hazards for users

Guiding Principle 3 – Benefits the residential neighborhoods by preventing spillover

- Sanctions proper planning to create sufficient capacity for parking
- Encourages proper wayfinding to use all available parking
- Encourages full use of available parking before expanding parking facilities
- Allows for residential guests
- Service community with residential permitting, where required

Guiding Principle 4 – Supports the sustainable use of public resources and sustainable development of the City.

- Makes efficient use of existing parking spaces
- Works in alignment with overall objectives of the City
- Economically sustainable – pays for itself
- Promotes development of improved efficiencies through new technology and operations
- Environmentally sustainable; Reduces congestion and carbon footprint
- Balances transit/mobility options, integrates and encourages alternative modes of transportation

Guiding Principle 5 – Applies smart decision making.

- Fact based – quantifiable metrics
- Makes appropriate use of technologies
- Programs create turnover where there is high demand
- Acknowledges unique needs of each district
- Plans new expansion and programs using these principles, with resolve to establish quantifiable data

The City's support for the parking management program must address questions about how and why the program operates. Without resolve to support the reasons and fundamental purpose of operations, then continuity and public trust will become eroded. The Vision, Mission, and 5 Guiding Principles are presented as the authoritative statement and purpose for how to operate the parking program on a citywide level. The essence of the program is developed from parking industry's best and most current use of successful practice found in other cities. The Vision is consistent with the adopted 2006 Master Parking Plan strategies for developing an effective parking program. The Parking Division will review the effectiveness of the Vision, Mission and Guiding Principle document annually.

Extraordinary how mathematics help you to know yourself. – Samuel Beckett

THE WALKER PARKING STUDY

A key element of moving forward after the repeal of the paid parking program was to obtain a solid understanding for the condition in which the parking system was operating. Some of the conflicting arguments that were presented through the recent period of paid parking were that the information provided about utilization and capacities were not fully trusted or understood. The Walker Parking Study of 2013 performed analysis on the entirety of the parking districts in the city and answered questions about capacity, utilization, turnover, and provided some recommendations on how to create improvements.

Test Period and Data

Perform analysis at some point during the non-peak and peak months of April through May and December through March, respectively. Perform analysis of peak and non-peak periods during those same months, with added but not exclusive focus on utilization and turnover from 11 a.m. – 2 p.m., and from 5 p.m. until 8 p.m. Wednesday, Friday, and Saturday's were the selected test days.

EFFECTIVE SUPPLY

The inventory of parking within the study area is adjusted to allow for a cushion necessary for vehicles moving in and out of spaces, and to reduce the time necessary to find the last few remaining spaces when the parking supply is nearly full. The effective supply is used as a tool or benchmark in analyzing the adequacy of the parking system rather than the total supply or inventory of spaces.

The parking supply generally operates at peak efficiency when parking occupancy is 85 to 95 percent of the supply. When occupancy exceeds this level, patrons tend to experience delays and frustration while searching for a space. Therefore, the parking supply may be perceived as inadequate.

The study area contains a total of 5,544± public spaces before any adjustments are made to account for the effective supply cushion. After the effective supply factor is applied, the study area's effective supply is judged to be 4,871± spaces. The following table provides a summary of the effective parking supply by district.

Table 3: Effective Parking Supply Summary

District	Total Capacity	On-Street	Surface Lot	Garage	Total EPS*	
Downtown	2,317	664	305	1,079	2,048	
Burns Square	314	164	111	0	275	
Judicial	644	391	166	0	557	
Rosemary	235	166	35	0	201	
Marina	611	0	551	0	551	
South Village	232	186	14	0	200	
St Armand's	1,135	554	436	0	990	
Newtown	56	33	16	0	49	
Totals:	5,544	2,158	1,634	1,079	4,871	
Effective Supply Factor			*85%*	*90%*	*90%*	*88%*

Source: Walker Parking Consultants

Parking Space Capacity

District	On-Street	Surface Lot	Garage	Total Capacity
Downtown *	779	339	1,199	2,317
Burns Square **	191	60	0	251
Judicial ***	460	184	0	644
Rosemary	196	39	0	235
Marina	0	611	0	611
South Village	216	16	0	232
St Armand's	651	484	0	1,135
Newtown	38	18	0	56
Totals:	2,531	1,814	1,199	5,544

Effective Supply Factor			
* County Spaces Not Included		92	
** County Spaces Not Included		205	
** Added Between Seasons	61		
*** County Spaces Not Included		89	973
Sub-Totals of Noted Areas	61	386	973

Of these spaces 2,531± are located on street; 1,814± are available in off-street surface lots; and 1,199± are located within parking garages. The County controls 1,359± spaces located in the Downtown, Judicial, and Burns Square Districts. This inventory is based on the public parking at the time of the Peak Season observation (February 27th to March 2nd).

Summary of Demand by District

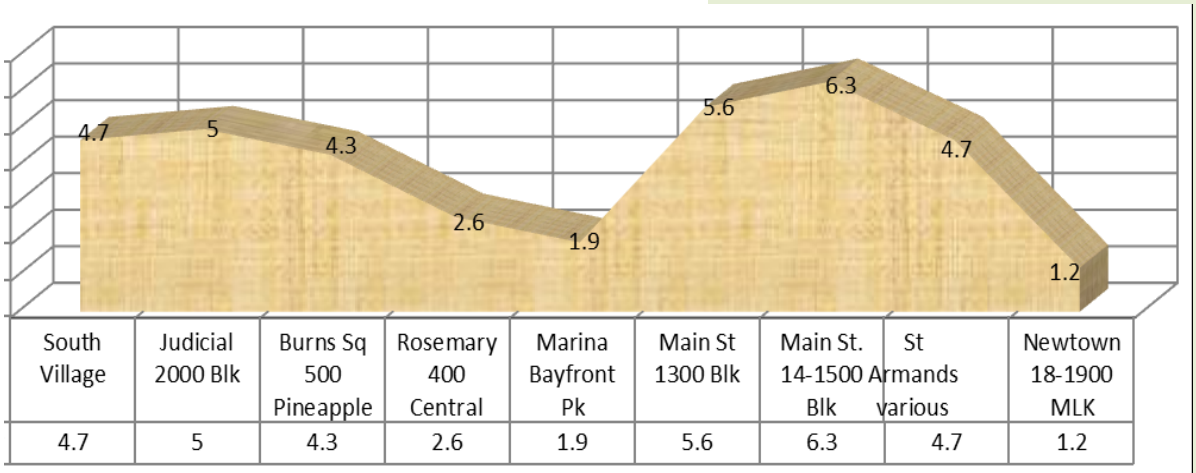
District	Peak Season						Off-Season					
	Wednesday		Friday		Saturday		Wednesday		Friday		Saturday	
	11a-2p	5p-8p	11a-2p	5p-8p	11a-2p	5p-8p	11a-2p	5p-8p	11a-2p	5p-8p	11a-2p	5p-8p
Downtown	67%	55%	73%	74%	54%	63%	58%	44%	60%	51%	54%	67%
Burns Square	68%	45%	64%	58%	51%	56%	46%	38%	56%	43%	31%	47%
Judicial	60%	38%	50%	30%	30%	33%	58%	40%	50%	35%	23%	28%
Rosemary	46%	51%	54%	39%	27%	36%	50%	31%	52%	35%	25%	44%
Marina*	66%	47%	45%	53%*	48%	54%	61%	61%	66%	87%	62%	91%
South Village	63%	80%	75%	55%	48%	58%	59%	66%	97%	63%	53%	78%
St Armand's	62%	65%	99%	98%	79%	77%	75%	55%	75%	81%	83%	76%
Newtown	13%	11%	18%	30%	32%	13%	11%	18%	20%	11%	18%	5%

Source: Walker Parking Consultants

* Marina parking lots experienced lower than normal results due to extreme weather during count periods. Subsequent analysis confirmed under normal circumstance occupancy levels reach 75-85% in this lot.

TURNOVER ANALYSIS

Turnover of parking within each of the districts was evaluated during the Peak and Off-Peak Seasons. A sample of specific parking spaces was made by recording the status of each parking space as either empty or with a portion of the license plate number on an hourly basis throughout the survey day. Where there is higher turnover, there are a greater number of patrons using the spaces. The following graph is indicative of the peak period observations.



Weekday Turnover Analysis

As anticipated, the Peak season weekday turnover was higher by approximately 20% higher compared to Off-Peak season weekday parking activities. Main Street and S. Pineapple in Burns Square experienced the largest change by nearly 30%, and St. Armand has experienced approximately 18% change in turnover in peak season. However this variance, which is slightly lower than other congested areas, is not surprising given that St. Armand's time restrictions is set at 3 hours, compared to Downtown's which is set at 2 hours.

Weekend (Saturday) Turnover

In season weekend turnover averaged about 10% higher compared to Off Peak weekend turnover of parking spaces. Most notable however is that the Downtown core area only adjusted by about 2% in parking turnover between seasons. As would be expected with increased visitors to the region, the Marina-Bayfront Parking turnover increased during Off-Peak season compared to Peak Seasons. St. Armand's turnover did not change from 4 cars per hour in both seasons on the weekend.

Walker Parking Summary of Key Issues

- Parking occupancies are the highest at the core areas of demand, with little incentive for parking patrons to park further away in order to improve turnover in high demand areas. This gives the appearance that there is insufficient parking supply.
- There is no incentive for people to park in off street facilities or surface lots.
- St. Armand's Parking District is short parking spaces in all seasons of the year.
- South Village/Hillview area is short parking spaces in peak season.
- Bayfront parking lots are reaching effective supply with frequency.
- New construction within the Downtown may cause a shortage of parking capacity.
- Special events held in the parking districts cause significant shortage of parking and confusion to visitors using the facilities and on street spaces.
- It can be very difficult to locate parking spaces in the high demand, close-in areas.
- Employees park on street consuming valuable patron parking spaces.
- Where parking supply is limited and surrounded by neighborhoods, parking spills-over in to the neighborhoods.
- Parking time restrictions end at 6 p.m., consequently, employees can find and use the most desirable parking spaces between 4-6 p.m. before most patrons arrive to find parking.
- Saturdays have no time-restricted parking spaces.
- There is not enough communication supplied to the general public about their parking options.
- Wayfinding to convenient parking is confusing or absent.
- The parking program has no other revenue streams to become sustainable except through parking citations. Parking is an unfunded liability on the general fund.
- Insufficient intra-departmental integration regarding impact of parking issues

Recommended Objectives:

The Parking Advisory Committee analyzed the recommendations contained within the Walker Parking Study for each of the parking districts detailed. Although not without certain caveats, the PAC unanimously endorsed the following key recommendations:

Downtown District

- Implement a paid parking program for the on-street spaces in the most heavily used areas;
- Provide off-street parking at either no cost or a much lower fee than on-street parking;
- Improve the signage that identifies the off-street parking opportunities;
- Remove time-restrictions in the off-street parking areas;
- Consider car sharing opportunities to reduce or eliminate vehicle use;
- Support the concept of "unbundling" parking costs for residential developments;
- Extend or eliminate on-street time limits along 2nd Street west of Orange Avenue; and
- Aggressively enforce the posted on-street parking time limit restrictions.

Burns Square District

- Extend the time limit for east-west on-street parking west of Orange Avenue from two-hours to three-hours to encourage long term parking away from Pineapple Avenue;
- Reduce the time limit for the most convenient parking (along Pineapple) from three-hour to two-hour parking;
- Purchase or maintain the current lease of the Orange Avenue surface lot;
- Add a "Burns Square Public Parking sign similar to the Whole Foods garage to encourage use of the lot by the public;
- Improve the pedestrian crosswalk from the public lot across Orange Avenue to increase safety;
- Increase lighting on the public parking lot to increase passive security efforts and safety in the evening; and,
- Improve efficiency within the existing public parking lot by eliminating the odd shaped interior curbs

Judicial District

- Consider implementing paid parking for the on-street spaces along Main Street to keep employees from parking in these convenient spaces;
- Remove or extend the time-restrictions for on-street parking along 2nd Street to encourage the use of these spaces by long-term parkers, such as employees;
- Aggressively enforce the on-street parking time limit restrictions.

Rosemary District

- Monitor conditions and consider how each development may impact parking demand;
- Time restrictions are not considered necessary at this time, but this should be monitored and considered in the future; and,
- Improve public parking signage for the surface lot to improve patron wayfinding to this area.

Marina District

- Add bollards and signage to keep patrons out of the grass areas adjacent to the Bayfront Park south parking lot for safety;
- Implement enhanced advertisement of the free valet parking program to the general public;

Southside Village District

- Improve signage for the public surface parking lot indicating the lot is for public parking;
- Monitor the need for a residential parking permit program for the residential areas adjacent to the focus area;
- Work with local land owners to maximize existing parking and develop options to encourage employee parking outside the core area; and
- Collaborate with the Hospital on opportunities to develop additional parking or to share parking in the parking garage during non-peak demand periods.

St. Armand's District

- Address the need for additional parking now, through planning and funding;
- Implement paid parking along the Circle and on the streets directly adjacent to the Circle to keep employees out of these spaces and increase turnover;
- Use the funds generated from paid parking to add additional parking;
- Continue time restrictions as posted and monitor for possibly extending the hours, including weekends;

- Begin planning a residential parking permit program for those areas located outside the current demand area to keep these areas free of non-residential parkers;
- Extend paid parking from St. Armand's to the beach front on-street parking, along Benjamin Franklin Drive, and use the funds to help fund new additional parking; and
- Improve public parking signage to the surface lots to improve patron wayfinding in the area.

Newtown District

- Monitor parking conditions and consider how new developments may impact parking demand;
- Continue to allow parking without time restrictions, but monitor this program; and,
- Improve public parking signage to surface lot to improve patron wayfinding to the area.

Downtown Sub-Area Analysis

Sub-Area		Supply	Demand	%
West of Pineapple	On-Street	348	344	99%
	Off-Street	761	539	71%
Pineapple to Orange	On-Street	301	281	93%
	Off-Street	757	443	59%
Orange Ave to Osprey Ave	On-Street	130	105	81%
	Off-Street	20	3	15%
Totals	On-Street	779	730	94%
	Off-Street	1,538	985	64%

Overall, each sub-area has adequate capacity; however, note the very high demand ratio for on-street parking, which creates the perception that parking capacity is inadequate in downtown.

While overall occupancy is below the level that indicates parking is inadequate, it is clear that on-street demand is well beyond the recommended level. We recommend considering implementing strategies to relocate patrons from the more convenient on-street spaces to the underused off-street parking areas.

Recommended Strategies for re-distributing parking demand:

- Implement paid parking program for the on-street spaces in the most heavily used on- street spaces;
- Provide off-street parking at either no cost or at a much lower cost than off-street

parking;

- Improve parking signage identifying off-street parking options;
- Remove time-restrictions for off-street parking areas;
- Consider car sharing opportunities to reduce or eliminate vehicle ownership;
- Encourage "unbundling" parking costs for residential developments;
- Extend or eliminate on-street time limits along 2nd Street west of Orange Avenue; and
- Aggressively enforce on-street parking time limit restrictions.

The Walker Parking Study was performed to create a baseline of knowledge about the unitization, turnover, and effective supply throughout most of the City's parking system. While the data in the study was surveyed in 2013, its significance in relative usage and supply remains a valuable toolkit of information today. In a growing economy such as Sarasota, it is highly unlikely a negative change would occur in the data. One only needs to consider the extensive growth in downtown residential buildings, restaurants, and other ancillary requirements to support the product of this growth to conclude the same position. Areas reflecting high use and low supply are mirrored in 2016, as no significant modifications in spaces counts have taken place since the study was done. The one exception to this, however, is the change in the downtown off-street sector as a result of the new State Street parking garage. The State Street parking garage delivered a net of approximately 259 parking spaces off the street. There were minor changes to the configuration of on-street parking.

Utilizing this study for today's understanding of how the city's parking resources are being impacted still provides a valuable perspective on the current parking issues.

The way to multiply big problems is to neglect small ones. – Henry Simons

Focused Parking Programs - Citywide

Employee Parking

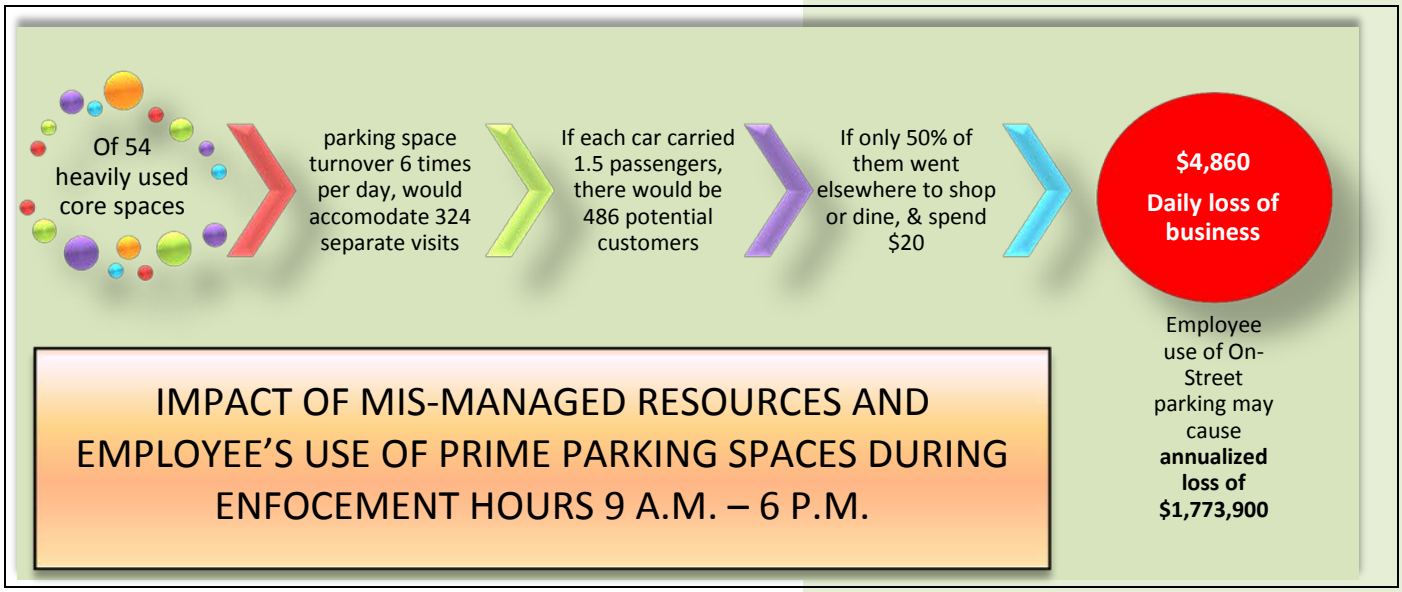
Managing the parking resources available for employees use is fundamental to a quality-parking program. Employees are an integral part of the success of any business, restaurant, etc., and therefore effective planning for employee parking is an essential part of a strategic plan. However, when the use of public parking spaces, by employees consumes prime parking spaces this burden does not help drive economic growth and economic vibrancy because it increases the time required to patronize a business.

Like anyone else, employees desire parking as close to their place of employment as possible. However, in many cities employees walk several blocks to work so long as their vehicle is safely stored, and their return to it well lighted. According to Robert Gibbs, Jeff Speck, and Don Shoup, there are no other definitively successful methods of deterring employees from parking in the prime parking areas except, by using parking meters. If employees were faced with paying public parking rates this would influence an employee's decision on where to park; further away if it costs less. In a no-payment parking program where time restrictions are the key factor of deciding where to park, an employee generally will park where there is less concern over ticketing.

The Parking program should encourage employees to park in long term parking areas, or where low cost alternatives make economic sense. In addition, alternative transportation methods can be pursued that provide economic benefit for the employee and decrease the demand on the parking and street systems of downtown.

Recommended Objectives:

- Develop program that motivates use of parking permits by employees.
- Discourage employees use of on-street parking that is located within reasonable walking distances (generally within 3 blocks) from their place of employment.
- Develop and coordinate effective communication program with employers.
- Recognize the need to supply employee parking in various forms through the districts.
- Encourage through incentives, increased use of transit options for working in each district.
- Evaluate potential use of Share Ride programs, Bicycle parking, and discount Transit options.
- Remain cognizant of the need to keep employee parking economical so that the employment workforce retains a healthy pool of talent.



Residential Parking Permit Programs (RPP)

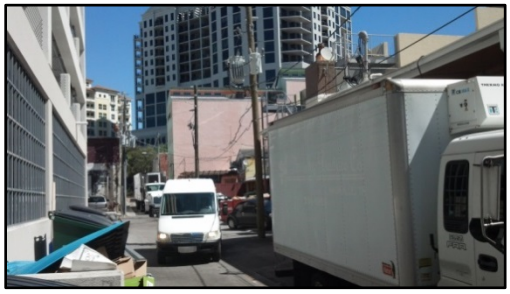
Some residential buildings located in densely populated areas were built prior to the time when the City established building codes that required parking spaces included with the development. Some parking districts within the City are landlocked by buildings and commercially zoned areas and streets. In addition, some resident areas abut commercial districts where there may already be a deficient number of public parking spaces. Consequently, in some of these areas there may be need for allowing parking on city streets within designated "zones" for residents. A form of protection to ensure the spaces are available is through use of a residential parking permit program.

Residential Parking Permit Programs (RPP) are designed to provide parking for residents who would not otherwise have reasonably available - legal parking accommodations near their residence. It promotes safety, health and welfare of the residents by reducing hazardous traffic conditions, noise and pollution. In addition, it promotes attractiveness and improvements in urban resident living. Through fair regulation, parking spaces can be managed so that either day or nighttime spaces are protected while for the resident while still providing general public access.

Cities across the country are using these programs successfully. With well-defined criteria for its use, and updated local ordinances, the City of Sarasota can implement similar concepts that can protect our neighborhoods from parking overspill.

Recommended Objectives:

- The implementation of RPPs in the City of Sarasota will be evaluated to determine the highest need in respect to parking demand, and the property owner's ability to park at or near their place of residency.
- Criteria/Policy for developing a RPP area will be established and consistently applied throughout high volume parking areas.



Alleyway Management and Accessibility

Alleyways are the backbone of the merchant support system within the city. The Parking Division is responsible for monitoring the use of the alleyways, preventing illegal use, and blockage of these important arteries. This serves to ensure businesses receive their goods and supplies, that commercial vehicles do not park on public used roads creating congestion, driver frustration, and provides for emergency vehicle access when required. As the services within each district grow, and in particular the Downtown district, proper and adequate access of the alleyways is paramount. Moreover, alleyway access is now required in development for new parking garage access points. Because the hours of use may be expanded in the future to meet the business need's the Parking Division will work with the City Engineer to determine appropriate times available for use, any changing parameters for delivery trucks, and the possible expansion of on street loading zones.

Recommended Objectives:

- The Parking Division will work closely with other city departments to effectively manage the accessibility issues, reducing clutter to improve truck capacity, and determine the safest and efficient means to ensure the alleyways remain open to minimize impact on commercial parking areas and access to the tenant property parking spaces.
- Continually monitor the necessity for appropriate use of on street loading zones, which can be restricted to time periods that do not present significant inconvenience to drivers and other businesses.
- Work swiftly to accommodate changing trends and demands for accessibility.
- Establish bi-annual meetings with delivery companies to exchange ideas on serving the merchants more effectively and gaining their understanding of the City's needs.

Communications

The Parking Program Communication's strategy should not be relegated to a "wait and see" approach. The goal of an effective communication program is centered on proactively addressing new and existing parking amenities, capabilities, and recommendations. To be considered a valued added program offered by the City, we must collectively think about parking differently. We must think differently, not just in needed policies, but also in adaptive responses to the public's parking needs. By communicating valuable information to users in advance, they can better plan where to park and understand how to avoid receiving a ticket. Our new communication strategies will decrease the level of frustration occurring when someone arrives to park by helping disseminate useful parking information in advance.

Example of "good-will" flyer

In Sarasota, the stakes are high when it comes to the information we need to supply users before they come downtown to park. It becomes imperative when working with complaints and parking issues that we use critical thinking in the exchange of ideas, and in solving problems. Many issues communicated as problems in fact are symptoms of another source. Critical thinking that solves the root issue will alleviate on going stress and debate over the negative issues. Our ability to communicate effectively about the parking program features, advantages and options is vital, and there are several methods, which the Parking Division will deploy.

a. Twitter
b. Communicate updates using website enhancements
c. Facebook
d. Email lists
e. Surveys scheduled at regular intervals

f. Print collateral relative to parking accessibility
g. Participation in local organization briefings about the program
h. Deploy use of Outreach with Visit Sarasota, DSA, Chamber of Commerce, and other associations
i. Public Workshops
j. Annual On-line Reports of Parking Division activity

External communication enhancements are critical, but also fundamentally important are the methods of internal communications. City employees interface with the public on a daily basis and are asked questions about how to manage issues that effect parking lots and garages, transportation, and ticketing. Reaching out and educating the City staff regarding the level of services provided by the Parking Division will help create continuity in operation and a stronger perception by the public.

The communication program will include providing regularly scheduled updates on the City's SharePoint and through written notices about the parking program changes, and initiatives within the city.

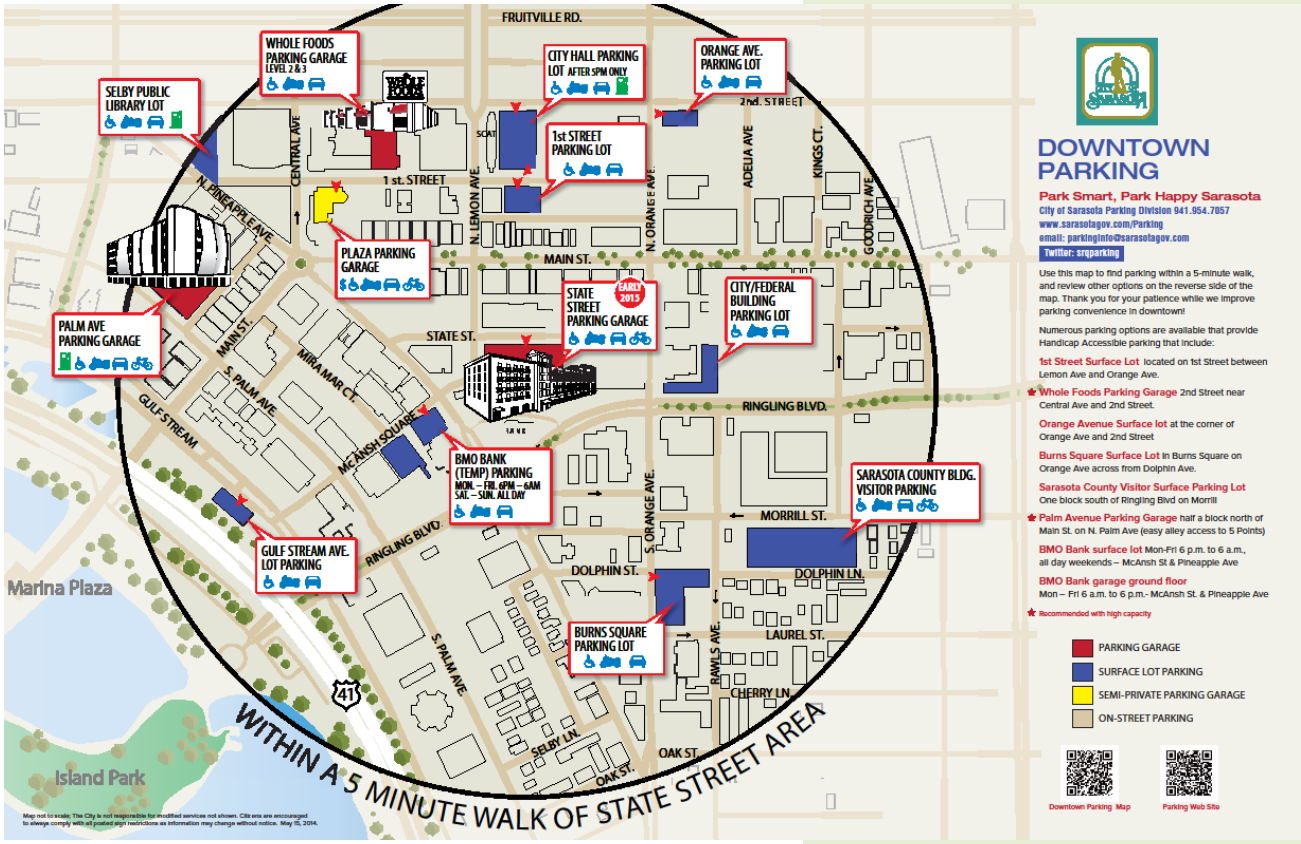
Recommended Objectives:

- Proactively communicate changes that effect parking customers, such as special events, construction, anticipated traffic/parking conditions, etc.
- Communicate the most common parking ordinance violations, and ways to avoid receiving a ticket.
- Clearly define and communicate the Vision and Mission of the Parking Program.
- Distribute regularly surveys about services, needs, and concerns.
- Engage the community business and resident association to continually receive feedback.
- Promote in a positive method the Parking Division as a service related arm of the City.
- Perform annual updates among internal departments to educate them on the Parking Division's operating plans.

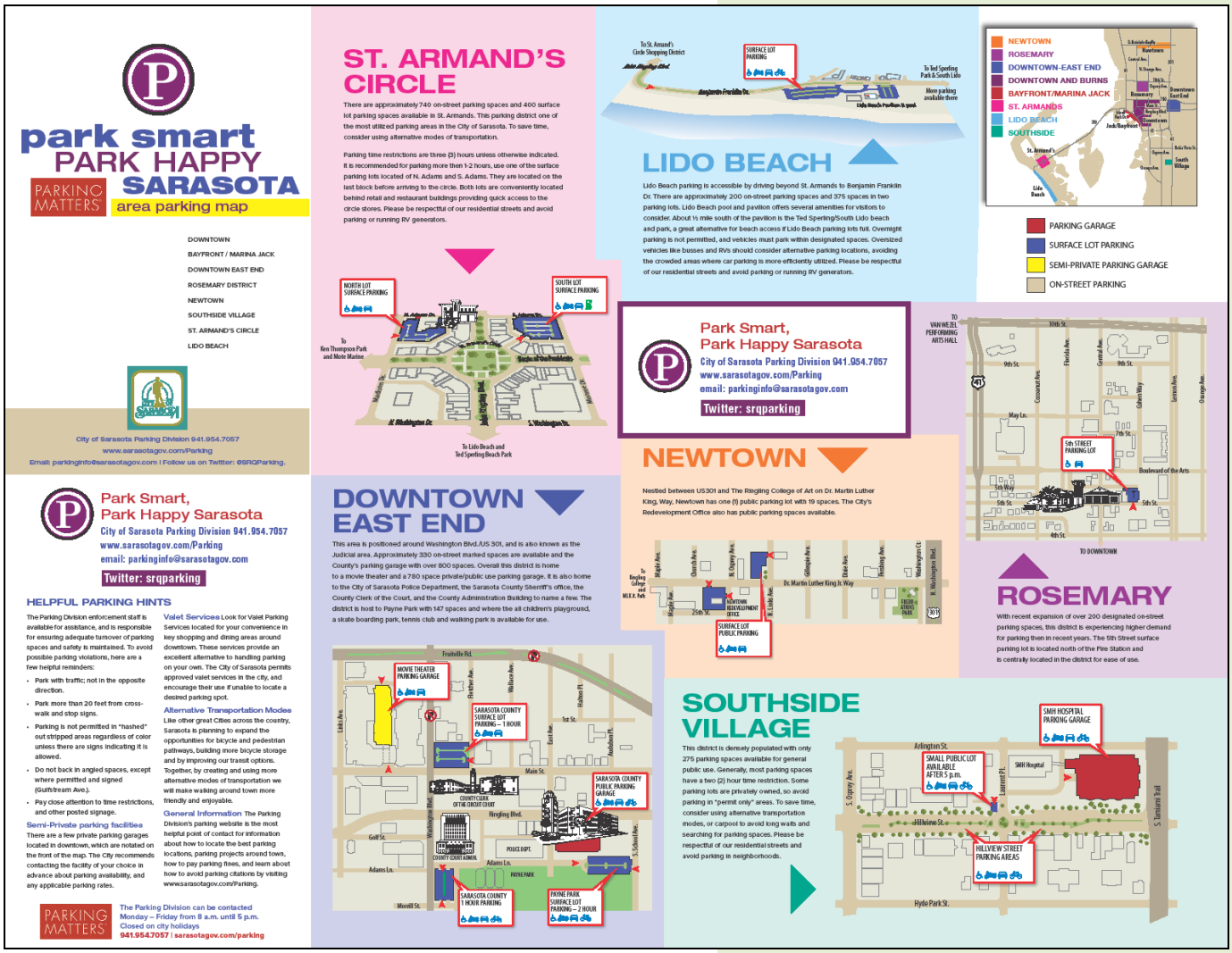
- Post annual reports on the parking website that reflect the parking program's activities and operating statistics.

Example of recent communication and parking maps"

State Street Parking Mitigation Map



New Citywide Parking Map (one side showing)



City of Sarasota, Parking Division Web Page

The City of SARASOTA

WHERE URBAN AMENITIES MEET SMALL-TOWN LIVING

Type Keyword Here

News & Events | Government | Departments | City Services | City Business | Things To Do

Permit Parking

The City Parking Program offers Employee Parking Permits, for employees working in downtown, and Residential Monthly Parking Permits for residents living within 1,000 feet of the facility for which they are permitted to park.

RESIDENTIAL MONTHLY PERMIT

Download Residential Permit Application

The residential permit is designed for residents who require additional parking near their place of residence. Each permittee must live wihin 1,000 feet of the location for which they are being permitted. Presently, the City is issuing pemitts for the Palm Avenue parking garage, the State Street parking garage, and the 2nd Street parking garage on level 3.

Applicability:

1. Applicant must prove identity and present two (2) matching forms of proof of current residency, located within 1,000 feet of said parking facility. Acceptable forms of residency documentation includes driver's license, utility bill, vehicle registration, residential lease, etc..

2. PERMIT MUST BE DISPLAYED AT ALL TIMES WHEN ENTERING/EXITING AND PARKING IN ASSIGNED FACILITY TO AVOID ISSUANCE OF A PARKING CITATION. PROOF OF 'PERMIT OWNERSHIP' AFTER CITATION RECEIVED WILL NOT BE CAUSE FOR CITATION DISMISSAL.

3. Permit is not transferable.

4. Permit is valid twenty-four (24) hours daily during the period stated on the agreement.

5. Sec. 33-107 of the City Code, prohibits use of city facilities to store a [permitted] vehicle. Permittee is required to regularly enter/exit the facility with permitted vehicle. Vehicles remaining in facility without movement may be subject citation. Please contact the Parking Division offices should any question arise pertaining to length of stay in the facility.

EMPLOYEE PARKING PERMIT PROGRAM

The City of Sarasota's Employee Parking program makes it easy for workers to find a place to park. Do not waste your time repositioning your vehicle around city streets and risk receiving a citation violation.

On-Street Parking
Garage Parking
Pay A Citation
Downtown Parking Map

Permits
Parking Questions or Comments
Frequently Asked Questions
Parking Operations Division (POD)
Parking Projects
Valet Parking Permits

Video On Demand

City Commission Meetings
Advisory Board Meetings
City Televison Programming

Get Involved

Find A Form or Application
Submit a Request or Concern
Visit a Popular Page
Pay a Bill Online

The Right to have access to every public building in the City by private motorcar, in an age when everyone possesses such a vehicle, is actually the right to destroy the City.

– Lewis Mumford

The Management of Public Parking in Surface Lots and Garages

The use of surface parking lots serves the community by providing convenient and quick access to and from the street. These lots should be considered viable parking alternatives that offer a good level of public parking service. Surface lots provide a better level of service then the use of a parking garage where extra time for driving ramps and locating a parking space is required. This is why a consumers first choice for parking location is an on-street space, followed by a surface parking lot, and lastly by a parking structure. In development of any future surface parking lots, the parking program should endeavor to avoid the use of large spanning facilities that subsequently exhaust expansive use of highly valued property. Maintaining some amount of surface parking lot spaces for quick and easy parking use should be considered a permanent fixture of the parking community. Maintaining reasonable time limits within surface parking lots, greater than on-street limit, provides a quick and convenient location for public parking.

Some surface lots also serve to fill the demand for employee permit parking. It is imperative that parking management monitor the ratio of use within the lots to determine the right mix of public parking spaces and employee permit parking. Understanding the correct mix during peak demand enables management to issue an appropriate balance of permits, which the lot can sustain, while first serving the public's need for parking spaces.

A professional parking program manages its surface lots and garages to ensure safety and service during peak activity. The Parking Division should begin integrating the use of best management practices for parking services, such as traffic direction to available parking, closing and blocking off entrances when a facility is full and redirecting parking customers to the next available parking facility. Taking these steps requires staffing, and additional staffing requires a fiscally sustainable program to fund services.

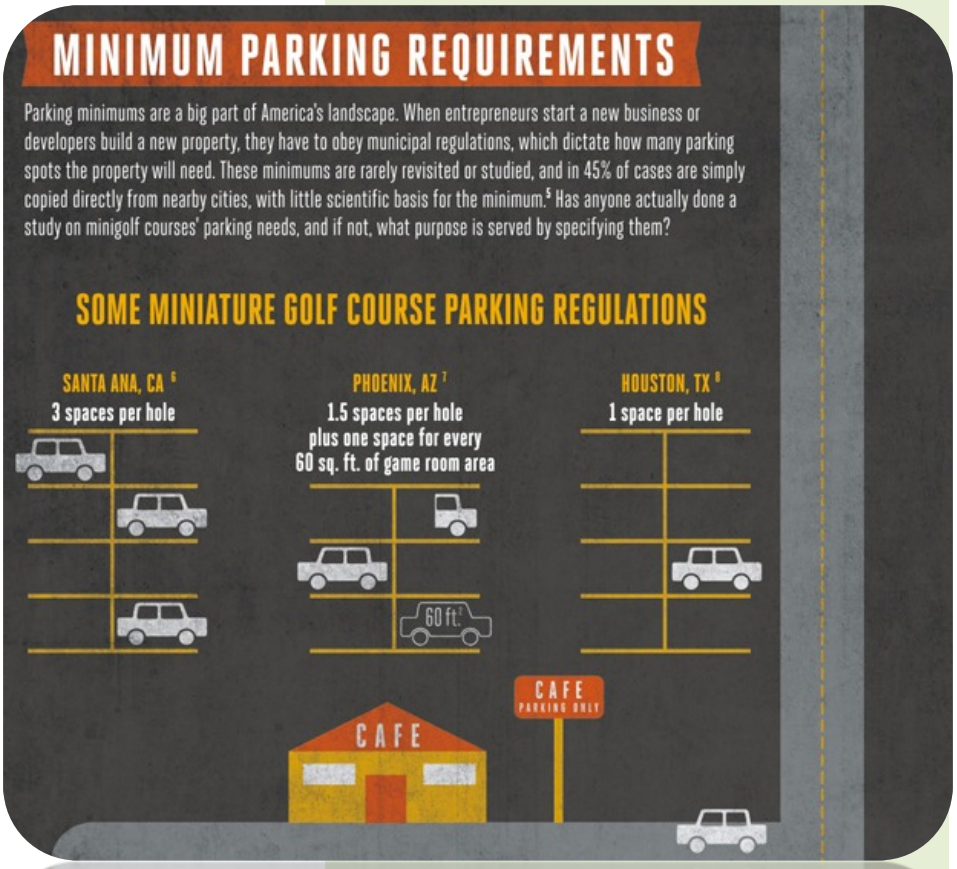
Historically, the municipal parking market has grown through local government's action to identify and build to meet the demand for parking access. Public parking accessibility has been seen as a public requirement that serves to enhance economic growth within a community. Build it, and they will come, is philosophy shared by many. In many perspectives, this may be true and the growth of public parking facilities has helped enhance business opportunities where they are erected. Other views suggest that parking development should be left to the private enterprise to fund and operate. Both viewpoints have their merits but have to consider the maturation of the parking market.

It is indisputable that most cities with vibrant economic districts operate various forms of paid parking. In those cities, the demand for parking access is high. In their early stages of economic growth, managing the risk to construct new parking facilities is often more effectively controlled by the local government. Why is this the case? Private operators are most often unwilling to risk the cost of development without a model of success first being tested. At the cost of sixteen to twenty-five thousand dollars per space, and higher depending on location development requirements, building a successful revenue pro forma without local experience demonstrating net revenues in other parking facilities is a risky for owners. The local government can build using local dollars, supported by citizen because it is seen as a public service they are providing. Once there is an element of confidence from the private developers that revenues could be realized, then, more interest will occur in developing privately owned and publicly operated parking garages. Consequently, the government risks the cost of building and first meeting the public's demand. There is little reason to suspect the business culture of Sarasota to operate differently. Until there is market saturation and successful models for revenues, government intervention plays an important role.

The future of new parking lots and garages is imminently threatened with the potential loss of the Community Redevelopment Agency (CRA) funding. In recent years, the CRA has provided significantly to the development of the Palm Avenue and State Street parking garages. Without tax incremental funding by the CRA it is unlikely the downtown would contain over 1,100 new garage parking spaces for the public's use. Since the Parking Division is void of significant revenue streams, aside from the enforcement of violations and parking citations, there is little hope in developing funding sources that accumulate as quickly as CRA funds. Incremental funding through organization such as the CRA, create an efficiency of scale that would normally require many years for a parking operation to amass. Developing a positive revenue stream for future developments that will meet the public parking demand will continue to be a much needed resource for the City. As an alternative to the government developing new parking facilities, it would serve the general public well if planners encouraged private industry developments to meet the subsidiary parking market requirements along with their own project requirements. Private developers should be incentivized to consider building parking spaces

that operate under paid parking programs. Doing so would help to serve the community's parking growth needs and provide an additional revenue stream for their projects.

Other services that the Parking Division would include complete integration of maintenance service for each parking facility. The Parking Division is organizationally more adept in understanding how to be responsive to the physical demands of each facility and in preventing any possible negative effects perceived by the public.

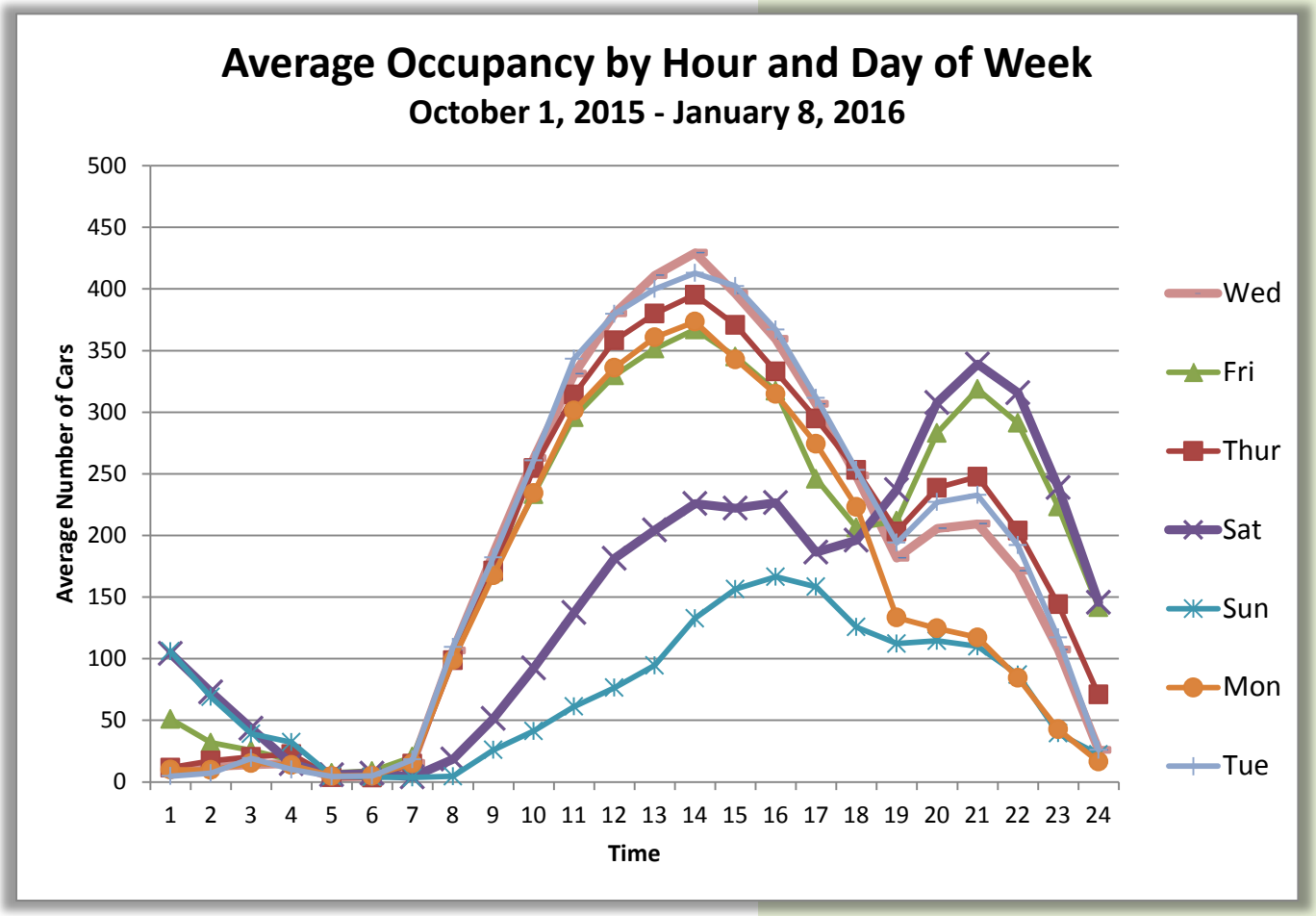


Recommended Objectives:

- Integrate parking industry's best practices for parking lot management.
- Develop a program to facilitate residential overnight parking.
- Manage effective ingress/egress, by staffing lots during peak periods
- Assume full maintenance and management duties of each parking lot asset, ensuring safe, clean and well-lighted facilities.
- Develop a capital improvement fund for surface Lot and Garage development or expansion.
- Implement policies that encourage parking further away from prime parking spaces on street, especially for those parking for more than 2 hours.
- If using paid parking, off-street parking spaces should cost nearly half of the price of on street parking.

Adaptive Parking

According to Paul Barter, author of Adaptive Parking: A Flexible Framework for Parking Reforms, SITCE 2013 Conference, and Parking minimums often fail on their central stated aim of easing on-street parking problems. Mandated off-street supply does not magically attract motorists away from the apparent convenience of free or underpriced, little-managed on-street parking. Parking studies all over the world repeatedly find busy areas with parking chaos in the streets, yet with nearby off-street parking that is under-used (for example, ITDP and Nelson\Nygaard, 2009). Mr. Barter continues; Parking chaos in the street does indeed have severe impacts on pedestrians and buses with serious congestion side effects from the parking search traffic, double parking and vehicles waiting for parking (Shoup, 2005). However, off-street parking supply does not magically solve such chaos if on-street parking remains poorly managed. Waiting for off-street supply to appear with new buildings is a distraction from the crucial task of improving the management of the on-street parking itself.



Managing facilities requires thorough understanding of operating metrics. This graph identifies average peaks in parking activity by day of the week, during the period described.

Parking Enforcement

The purpose of a parking enforcement program is to provide for safe parking environments, and encourage turnover of time-restricted spaces to benefit the economic vibrancy. The City's Parking Enforcement policies have been greatly impacted by the changing parking program over the last few years. Parking Enforcement within the City has, due mainly to various organizational changes and parking program changes, been inconsistently applied over the course of the last 5-7 years. Such a roller coaster effect can cause distrust and confusion relative to the expectations.

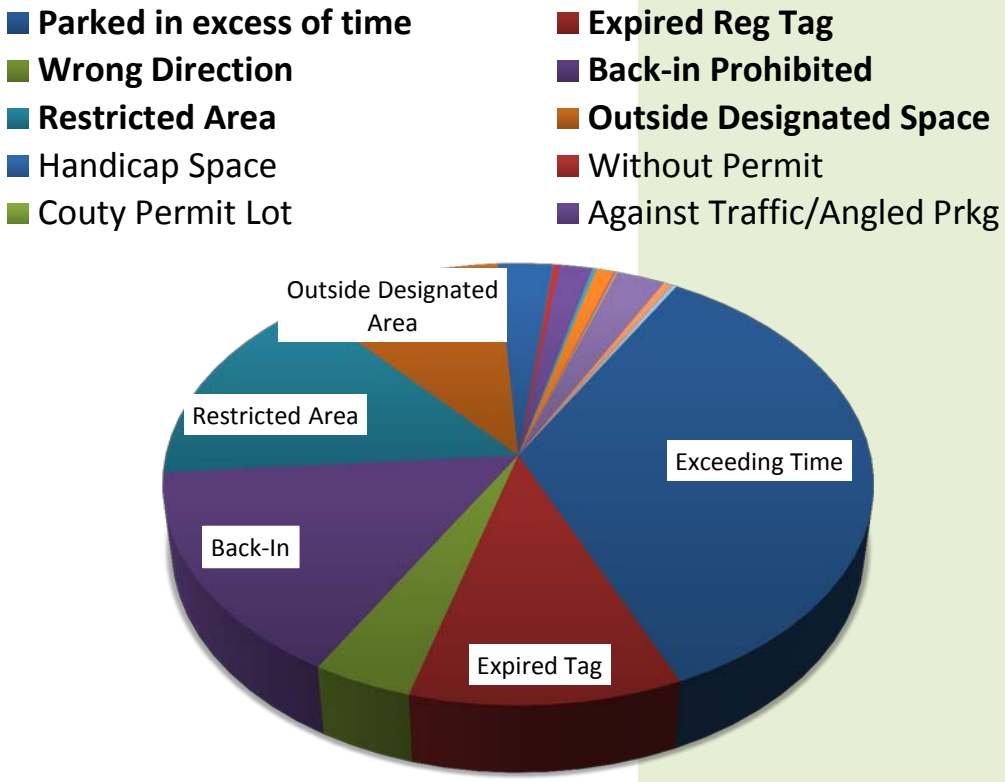
Parking Enforcement is not effective if it is seen as punitive and threatening. Instead, Parking Enforcement needs to become an integral part of effective on street parking management that serves the community. The public, by and far, imagines parking enforcement as a means to create revenues for the city as opposed to deriving a community benefit. Few understand the positive impacts made by parking enforcement staff that provides benefit to accessible parking. The parking program must endeavor to become more creative in its efforts to develop citizenry goodwill and effective communication. In an effort to disseminate positive messages to drivers, new parking enforcement vehicles will display the message, *"Safeguarding a Parking Spot for You."* This message is direct and to the point, and it expresses the effort to maintain safety and order in parking so that each person can find easy access to parking.

Many enforcement programs in other cities have successfully transitioned away from the use of enforcement as a tool in communicating parking restrictions and ticketing. Without a paid parking program the enforcement effort to create turnover and make spaces available is never achieved to the desired level. In these cities most operate a paid parking

TIDBITS Citation Facts Oct 2013 – Sep 2015	
Handicap Violations	1087
Citations before 3 p.m.	65%
Safety Related	31%
Vehicles Immobilized	447

program that naturally encourages parking customers relocate their vehicles without heavy enforcement. The ideal model for enforcement minimizes the use of citation writing to achieve parking objectives. However, regardless if the primary tool used for enforcement is citation driven or paid parking, the overall program should remain consistent and communicative as a means of encouraging the community to abide by regulations so that everyone benefits from improved accessibility.

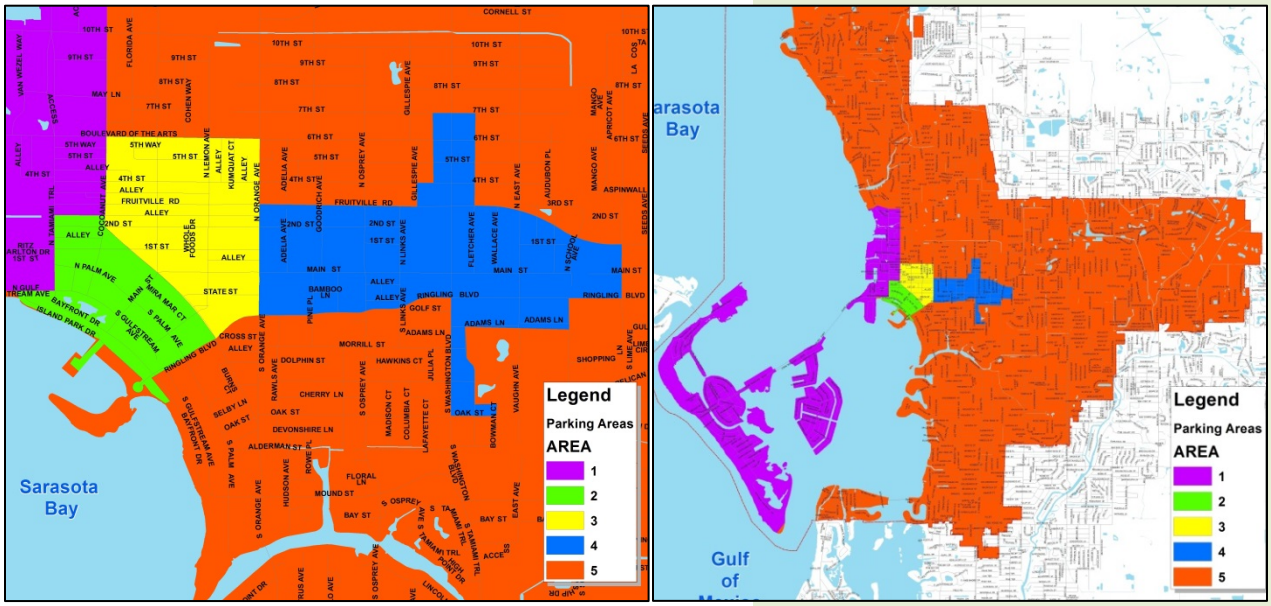
At times, enforcement capture rates reach near the thirty (30%) percentile range during the hours of staff operations. During most operating periods, the citation capture rate is in the twenty-five



Graph represents most common types of violations captured on average (not a complete list).

(25) percentile range. The parking industry teaches standards in managing enforcement capture rates, and states that rates above 35-40% cause major strife and outcry from citizens. The City of Sarasota's parking program must seek a level of continuity in capture rate that is not based on a predetermined threshold, and yet remains cognizant of the community's sentiments.

Maintaining continuity of the enforcement programs means the operating credo and application of monitoring for violations are cited consistently, so that the public does not perceive unfair treatment. The City of Sarasota Parking Enforcement program has varied its staffing schedule in the past to align with the city's time restriction ordinance. While that schedule has been modified from time to time, it currently is Monday through Friday, from 9 a.m. until 6 p.m. Unfortunately, there are significant numbers of violations occurring after 6 p.m. that are safety related. *There is an even larger assembly of employees that arrive to park on the street near 4 p.m., and subsequently, because time restrictions end at 6 p.m., remain parked on the street the entire evening*. These behaviors are not favorable and inhibit the advancement and the goals of accessibility and merchant foot traffic.



Citywide Parking Enforcement Zones

TIDBITS Citations Appealed Jul 2013 – Jun 2014	
Upheld	117
Dismissed	23
Converted to Warning	174

The perception that parking citation violations mostly come from time restrictions is a misnomer. The fact is that 2 out of 3 tickets are written for safety related violations; conversely, 1 in 3 tickets are time violation related. Understanding this metric and the time of day when they happen, enables management to focus scheduling when violations that are more serious occur. However, further observation is required and the ratio of citation violations is not a constant. For example, we note there are many violations occurring

after the typical end of day schedule for enforcement officers. The proliferation of unsafe or otherwise illegal parking after 8 p.m. appears to be on the increase.

Recommended Objectives:

- Develop enforcement program continuity by scheduling enforcement personnel during the evening hours when safety violations are frequent.
- Ensure that enforcement personnel expense of staffing is less than the citation revenues derived by having staffed the position.
- Utilize enforcement personnel to monitor Valet compliance with City Code and Ordinances.
- Establish effective interface with SPD Volunteer Force who write parking citations.

Time is the new luxury. Many people will pay a reasonable cost to park nearby their destination. Others, more frugal, have options available to them. – Robert Gibbs

Paid Parking Program

The debate about paid parking has a dubious history. Overcoming the perception that paid parking negatively affects a city's merchantability is not easily dissuaded. Demonstrating purpose, benefits, and presenting a collective voice on how to address using meters, the common rejection can be dissuaded and given due course it can achieve by defining objectives that benefit the entire community. Well maintained parking systems like those in Orlando, Tampa, St. Augustine, Daytona Beach, Charleston, S.C, and even Bradenton, that have operated for decades, would be criticized by the public and merchants if given the opportunity to protest the program realizing there is an opportunity to recall them. However, these cities, very similar to the City of Sarasota (high tourism and seasonal residents), also understand that managing parking resources must be accomplished in a manner that does not create ill-will among residents. Reliance solely on a

parking citation program is historically contentious. Perhaps more importantly, these cities recognize the lost opportunity to affect positive change if they do not implement practices that are successfully utilized for controlling the parking resources.

Jeff Speck speaks with hundreds of municipalities and business within those districts annually. Mr. Speck reports, "Surprisingly, it is often the downtown merchants who fight most ardently against increased meter rates or expanded hours. Their opposition is based on an instinctive fear that shoppers will be scared away, and their sales will suffer. In city after city, the business-owners who fought the loudest against market-based pricing were among the first to admit that once instituted, it increased their sales dramatically. The parking meter was invented, after all, to help businesses – by increasing shopper turnover."
Issuing citations is not effective as the only method for creating turnover of parking spaces, or a deterrent for abusing on-street parking. Non-patrons are familiar with enforcement schedules and are further willing to chance the possibility of receiving a citation, while visitors and patrons see the citation as un-welcomed slap on the hand (that was extended with a credit card contributing to our merchants). In short, paid parking is not a punishment; it is a *management tool*, which allows the central business district to have the most appropriate turnover of patrons in a straightforward yet customizable manner.

It is well documented that, directly or indirectly, everyone pays for parking. The Vision of the Parking Division is Smart, Safe, and Sustainable. The Parking Division must manage parking resources so that they benefit the users, and enhance the businesses and community in which we live. By using smart and sustainably proven business models, the Parking Division can prove to be an asset that benefits the community through its services, sustainable programs, enhancing the environment, and being fiscally responsible. Successfully modeled programs manage their parking supply as a valued city asset, which drives efficiency, and helps improve opportunity for economic growth. Asset management means that the value of on street and off street parking are recognized, as well as their cost and opportunities.

> ***Parking is a public good, and must be managed for the public good. – Jeff Speck, Walkable Cities***

According to the City of Denver, Colorado, Strategic Parking Plan (2013), "the cost of parking is more than just physical. The opportunity costs associated show that parking is worth much more than about the quarters it takes to put in meters. Its value is evident in terms of economic development, land use, the health and connectivity of the overall transportation system, and environmental sustainability."

WHAT IS PAID PARKING ALL ABOUT?

Paid Parking - It's About ENVIRONMENT

It is a city's duty to develop sustainable transportation and parking systems that benefit their community. The need to reduce carbon footprint of dangerous emissions, to balance the demand for cars, roads, and parking lots against the opportunities to develop green facilities and parking spaces must continually be at the forefront of strategic planning. The Parking Division needs to do its part by implementing long term policies that lead to self-sufficiency, help parking facility design improvements, and that create symbiotic systems that are intuitively used by consumers.

Meter parking programs benefit our community by reducing the amount of vehicles emitting tons of carbon monoxide and that cruise around searching for parking spaces. Implementing advanced parking management programs with meter parking offer alternative methods of travel that reduce congestion and encourage alternative mobility options like shared rides, mass transit, bicycling, walking, etc. Meter parking creates opportunity to promote and fund alternative mobility options through the generation of parking revenues, and helps to finance alternative "green" parking facilities.

Research is showing that free parking is one of the largest influences for people's mode travel choice. Free parking encourages the use of vehicles and increases the amount of driving to locate parking spaces. A recent study by Millard-Ball Wienberg Hampshire, 2014, Assessing the Impact of San Francisco Park, the City's parking management program, showed that implementation of

variable pricing based on demand levels reduced cruising in half, compared to other areas with fixed meter pricing. Driving time fell by 30% in those areas and parking fines dropped as well. When the meters were turned off, cruising went up dramatically. The Environmental Protection Agency (EPA) reports that 32% of the nation's carbon footprint is related to transportation.

Jeff Speck, Walkable Cities – "And you want free parking, why?"

This subsidy could perhaps be justified if it produced some greater good for society, but it only produces one benefit: cheaper parking. How does it perform in terms of other important measures? Well, it worsens air and water quality, speeds global warming, increases energy consumption, raises the cost of housing, decreases public revenue, undermines public transportation, increases traffic congestion, damages the quality of the public realm, escalates suburban sprawl, threatens historic buildings, weakens social capital, and worsens public health, to name a few things. And you wanted free parking why?"

Paid Parking - It's About Service

Sophisticated, well-planned and calculated businesses recognize parking as a critical resource in their evaluation of potential new business expansion. Business customers, shoppers, restaurant guests, all first think about the availability, or conversely the hassle of locating parking. Where parking is free in prime areas, people tend to gravitate and remain there occupying the spaces until a restriction requires they move on, leaving little chance to create a sense of convenience. Where parking is free then, the available parking resource significantly decreases. A customer who cannot locate close in parking often chooses to go elsewhere.

Widely utilized by municipal governments that recognize managing sustainable parking and transportation system involves the use of a paid parking program.	
Florida Cities with On-Street Paid Parking	**2014 Population** (SRQ: 54,214)
St. Petersburg Beach *	9,471
Palm Beach *	10,468
Naples *	11,325
St Augustine *	13,679
Bartow	16,515
Key West *	25,530
Lake Worth	36,000
Bonita Springs *	47,547
Coral Gables *	49,631
Ocala	57,468
Pensacola	55,024
Kissimmee *	65,173
Daytona Beach *	62,316
Ft. Myers *	68,190
Melbourne	77,508
Lakeland	93,428
Miami Beach *	91,026
Pompano Beach	101,128
Panama City Bch *	102,064
West Palm Beach *	102,436
Clearwater *	109,703
Miramar	111,705
Gainesville	122,671
Hollywood *	146,520
Tallahassee	176,429
Ft Lauderdale *	172,389
Orlando	255,483
St Petersburg *	249,688
Tampa	336,246
Miami	395,434
Jacksonville	852,450
**Seasonal Populations like Sarasota*	
Aspen, CO *	6,728
Santa Monica, CA *	92,472
Charleston, SC *	127,999
Petoskey, MI *	5,756
Traverse City, MI *	15,108
Bangor, ME *	32,673
Galveston, TX *	48,733
Dunedin, FL *	35,819

One only needs to talk with a storeowner or clerk to find out how often their customer's comment about the lack of close-in parking spaces in the City of Sarasota. This impact is realized citywide in all parking districts. Robert Gibbs, ASLA, AICP, Urban Retail Institute, states in his book, Principles of Urban Retail Planning and Development, where prime on street spaces should be metered and more expensive than outlying street spaces, off-street surface lots and garages. Moreover, Gibbs says meter spaces should achieve a turnover of 18-22 cars per day. Based on the Walker Parking Study, Turnover Analysis for the City of Sarasota, the highest turnover in the Downtown Core is approximately 5.9 cars per day during peak season with a recorded occupancy of 100% of the spaces. Off-season turnover is approximately 4.7 cars per day with occupancy rate in the mid ninety percentile.

A managed paid parking program improves economic vibrancy by ensuring adequate parking space turnover by using a less punitive approach, so that patrons can find parking spaces nearest their desired destination. This makes coming to the parking district easy, and trouble free. The result is consistent with the Parking Management Program's Mission statement.

Properly established meter parking is a positive force of competition against potential loss of customers to mall traffic. Meter parking provides higher levels of service and convenience by ensuring consumers who desire close-in parking will have it available, and provides other optional parking choices (including free parking) for shoppers. Operating paid parking establishes value to the parking asset (parking space) and then induces users to determine their parking choice, i.e., short term, long term or economy (free) parking thereby creating a voluntary redistribution of parked cars that improves parking availability for customers and broadens the shopper's choices for convenience. Short term – quick stop parking can be done more easily with less walking to a desired store because the system will always plan for a percentage of spaces will always be available. Long-term shoppers can opt for less expensive parking choice and walk slightly further because they have more time and desire to get a cost savings.

This creates real advantageous for parkers as these choices can increase foot traffic within the districts, which shopping malls cannot reproduce. People that chose to park close for quick turnaround are more willing to pay for parking then those who may park for extended periods. “Free” parking only increases congestion, reduces turnover of parking spaces, discourages transit use, carpooling, and other forms of alternative transportation.

Implementing meter parking would enable the City to deliver various industries’ best services, such as vehicle wayfinding applications. Using wayfinding smartphone apps is an excellent marketing feature that improves customer convenience and improves the relay of useful information to a parker. These apps will direct a driver to available parking spaces, saving them time and money when they come downtown. As Robert Gibbs states, “Time is the new luxury. Many people will pay a reasonable cost to park nearby their destination. Others, more frugal, have options available to them. “

An exciting new feature of meter systems allow integration of local merchant’s participation by installing merchant controlled validation programming on the meter face or on a meter parking ticket face itself. Sales can be advertised by hour of day, day of week, or any other combination. When consumers utilize these merchant validations, a data base records the sell and reports the program’s effectiveness on each use, which helps provide excellent details about shopping metrics in downtown and offers the local merchant an advantage and stake in the use of parking meters.

Another service enhancement using meter parking programs is that the City could sell the use of pre-paid parking cards. Pre-paid cards make it easier for a frequent shopper by dismissing with the use of coins to feed the meter, they can simply use a pre-paid parking card, or use conventional credit cards. With this service amenity, it makes the decision to park and use a meter easier to make.

Pay by Phone technology has been embraced within the parking industry and Sarasota’s use of smartphone technology is continually growing. A new meter parking program would include implementation of pay by phone technology, enhancing the level of

convenience for pay to park. A phone call to the parkers' account, and a space number, allows the user to avoid altogether any interaction with pay machines or meters. The best feature using pay by phone is it allows a customer to extend their parking time at the dinner table, or while in a move, at any location throughout the system.

Implementing meter parking adds a completely new dimension of positive consumer options for shopping, dining and doing business in downtown, improving the service levels without fear of time restriction citations. Parking metrics can easily be monitored and utilized to help understand the levels of vehicular activity within any given zone, so smart decisions can be proactively made that affect the users in a positive way, and the potential walk-in customer base can increase. Using real time data from this system, if metrics indicate an overabundance of spaces is the result then parking fees can be easily reduced to balance the parking resources.

Paid Parking - It's About SUSTAINABILITY

Sustainability no longer is seen purely as an additive to design, it has moved toward integration in process and form. Parking and transportation solutions can help to improve economic feasibility through enhancing accessibility and the right price structures. Parking solutions help improve the public health and welfare of a community by reducing congestion. Quality parking strategies coalesce the elements of good business practices by helping advance multi-modal and transportation demand management. Parking and transportation solutions advance these concepts by educating users and providing incentives that affect positive change. Well-planned parking and transportation solutions can increase the use of mass transportation, reduce the number of cars using our streets, minimize fuel waste and emissions generated by searching for parking spaces, and encourage alternative travel such as walking or bicycling. Many parking facilities today are adopting best practices in sustainability through alternative fuel vehicles and new automobile technology, energy-efficient lighting, solar panels, and innovative water and waste management systems. The City of Sarasota's Palm Avenue Parking Garage is an excellent example of facilities developed using sustainable practices.

The Parking Division must evaluate new parking programs and ideas based on achieving long-term objectives that reflect and promote sustainable objectives. To achieve sustainability, the formulation of parking policy, the impact of our decisions, demand careful consideration before taking action to change. New parking programs must acquiesce to the Parking Division's Vision, Mission, and Guiding Principles. Additionally, because we have a growing community we must provide new programs with a self-funding mechanism, in order to maintain its success and relieve burden of regressive taxation on those who do not utilize the system.

The natural tendency for planners and users is the desire to add as many additional parking spaces on street as possible. When additional capacity is increased and spread across the surface street, it again, entices drivers to cruise to find an opening parking spot closer to their destination on-street first, instead of using a densely planned parking garage. Parking garages, plainly stated, are more sustainable by the mere fact they reduce driving and on street congestion. Parking garages use a fraction of the land that on street parking or surface parking lots require.

Paid parking programs become a pathway to obtaining sustainability improvements because they provide the financial resources needed to continually improve the infrastructure, purchase valued service enhancing technology, and more.

The chart below, Metered Parking Area Utilization Data by Block: Summary Jan 11-14, demonstrates how the reflecting data can indicate adaptive responses to pricing. The areas colored in red indicate when utilization of parking is at a peak, and the areas in the green or lighter colors indicate lower utilization. By studying this information over longer periods, pricing adjustment to lower parking prices may be prudently taken during times when utilization is unproductive to the business community. Conversely, when utilization is higher, an increase in

pricing might produce higher turnover of each parking space, and thus provide more purchasing opportunities. If we encourage less parking demand by spreading the demand periods further apart in time, we advance the cause of sustainability.

Metered Parking Area Utilization Data by Block: Summary Jan 11 - 14

Block	Total sp aces	9am		10am		11am		Noon		1pm		2pm		3pm		4pm		5pm		6pm		7pm		8pm	
S. Palm	39	7	18%	13	34%	21	53%	31	79%	30	78%	26	66%	21	53%	19	47%	18	46%	30	76%	37	94%	33	83%
N. Palm	21	6	30%	9	44%	13	63%	17	82%	16	75%	15	71%	10	45%	9	43%	13	60%	19	90%	18	85%	20	96%
1300 Main	44	20	44%	22	51%	31	70%	39	88%	39	88%	36	81%	33	74%	33	75%	30	68%	40	90%	43	97%	43	98%
Central	11	6	50%	6	55%	8.3	75%	10	91%	10	89%	9	77%	8	68%	5	48%	5	43%	9	84%	10	91%	10	91%
1300 1st St	13	2	27%	4	48%	7.3	76%	8.3	90%	6	66%	7	77%	7	72%	5	48%	6	63%	8	90%	9	92%	8	90%
N. Pineapple	10	3	30%	4	38%	3.8	38%	9	90%	8	78%	7	65%	4	43%	3	33%	4	40%	10	95%	10	98%	10	100%
1400 Main	50	17	35%	23	46%	39	77%	48	96%	48	96%	47	94%	37	74%	33	66%	36	72%	49	97%	48	97%	49	98%
1500 Main	55	27	49%	29	52%	43	79%	54	99%	54	97%	52	94%	45	81%	39	71%	47	85%	53	97%	54	98%	55	99%
Total Core		✗ 35.3%		✗45.9%		! 66.3%		✓ 89.4%		✓ 83.3%		✓78.1%		! 63.8%		! 53.8%		! 59.4%		✓ 90.0%		✓ 93.8%		✓ 94.5%	
Main St		✗ 42.5%		! 49.6%		✓ 75.2%		✓ 94.0%		✓ 93.8%		✓89.5%		✓ 76.4%		! 70.6%		✓ 74.7%		✓ 94.7%		✓ 97.1%		✓ 98.3%	
Palm Ave		✗ 23.9%		✗39.0%		! 58.2%		✓ 80.8%		✓ 76.3%		! 68.7%		! 49.2%		✗ 45.1%		! 52.8%		✓ 83.1%		✓ 89.4%		✓ 89.9%	

Setting meter price must be carefully considered. The parking program should use all data sources available to determine the most effective approach. Setting rates that are constant, or based on dynamic pricing principles that increase with length of stay will ensure we achieve the industry's recommended and best practice of maintaining at least 15% open parking spaces and in reducing the amount of driving required to locate available spaces.

The Parking Advisory Committee's Guiding Principle #1, supports the economic vibrancy and street life by returning a portion of revenues to district improvements. The by-product of a pay for parking system is that revenues can be generated that support and sustain smart growth programs and operations. Those revenues could be returned to benefit the local area for various purposes within the district where it is established. On-street Parking system revenues could be used to provide grants to local merchant associations, used to improve store fronts, sidewalks, equipment, landscaping, helps develop transportation systems, and support a number of business related needs. By pledging an escalated percentage of revenue proportionate to the increased revenue growth, each parking district involved can reap the benefits of funding.

Paid Parking - It's about Fiscal Duty

A successfully managed parking program requires resources. It requires resources to serve the public by providing guidance, evaluate and plan future developments, maintain and repair facilities, perform compliance monitoring (staffing), measure effectiveness, and adjust program methods to ensure the correct mix of pricing strategies and public amenities are achieved. In order to meet this role, parking utilization studies and analysis have to be completed which take time and administrative and operational efforts accomplished that serve their users. Aside from returning some portion of revenues to the public, revenues from a paid parking program would mitigate the Parking Division's budgetary expenses for operations. This is an important issue to address when considering the subsidy received by the Parking Division from the General Fund budget, which will exceed more than $2.2 million in FY2016 over the preceding four-years!

Implementing on-street and garage paid parking would generate sufficient revenues to accommodate the program to maintain, clean, light facilities, landscape, paint, build, staff, and otherwise recover the cost of the parking operation.

At present, the city subsidizes the Parking Division as it continues to expand and improve its parking program, all funded through taxation by citizenry who never utilize parking in the business districts. Extending the use of tax dollars to fund the parking program can be seen as regressive and unfair. While there are some municipalities that continually receive subsidies from their agencies, few of them go completely without leveraging the public parking demands and generate revenues for parking as a user fee. A paid parking program will place the fiscal management of the system squarely on the users of the system, and not the citizenry tax base. Compared against mall parking, also a user form of payment, meter parking does not cause retailers to raise prices to offset the cost of a lease, or divert the expense to consumers through higher product price setting.

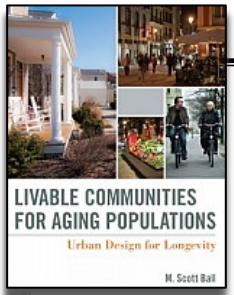
The impact of paid parking programs substantially improves economic development within a community. Robert Gibbs, Urban Retail Institute, estimates one parking space of prime parking creates $175-$225,000 of annual revenue generation. Using a more a conservative average, if a consumer spends just $40 during an average trip, with a turnover rate on average of 5 cars per day, then one space is equal to $200 per day. Extrapolating this amount over 365 business days is over $73,000 per space, per year. In Sarasota, one prime block alone has 54 spaces, which can generate over $3,942,000 million annually!

Parking availability on street and off street will improve by implementing meter parking, and give businesses a greater chance of success with more "foot" traffic. By increasing merchant sales, we improve the generation of sales tax, which is then used to fund other municipal necessities and functions. Each parking space holds significant value to merchants in the potential spending power of each parking customer.

FREE Parking…It is a "blurry" proposition!

Free parking is the ultimate Trojan horse. Sure, free sounds great, but it comes with costs that impact everything from the congestion on your street, to the cost of rent, to prices at the grocery store. And everyone is paying whether you own a car or not.

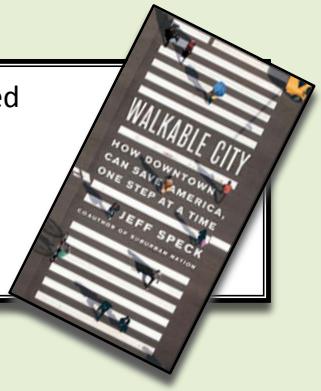
What do experts in city planning and economic development believe?



During Andres Duany's 2007 visit, he was also quoted saying Sarasota needs parking meters if we want to successfully manage our parking:

"Why do you have a parking problem? Because you have no parking meters!"
-Andres Duany addressing the Sarasota public in City Hall, 2007.

When Jeff Speck, a leading author on city planning and development, was asked what we should do about the failed meter parking program during his City of Sarasota visit in 2013, he responded by saying, "Third times a charm! What are you waiting for?"



Correspondence with the City of Sarasota, Urban Planner and Parking expert Donald Shoup offered his input on our current situation: "I suggest offering every block the option to have meters, and commit to using all the revenues from the meters to pay for added public investments on the blocks with meters. If parking is in short supply, making it free doesn't help." – Donald Shoup, via email, 2014.

Donald Shoup, professor of Urban Planning at UCLA and author of *The High Cost of Free Parking*, recently spoke about his long effort to get cities to rethink their relationship with parking, namely by charging for it. Shoup says the long-held idea of free parking as a public good makes it difficult for the government to charge for it, but he believes governments should.

Governments bear the costs for the land, for paving parking spaces and for cleaning them, as well as an opportunity cost for what that land could be worth if not used for parking. Those costs appear in city budgets funded by–you guessed it–taxes and fees on residents and businesses.

"Parking doesn't just come out of thin air," Shoup tells Vox. "So this means people who don't own cars pay for other peoples' parking. Every time you walk somewhere, or ride a bike, or take a bus, you're getting shafted." If nothing else, charging for parking will place the brunt of the cost of parking on people who own cars and use parking, rather than spreading it out evenly even on non-car owners. We are all paying for "free" parking, even if we are not using it. It's time to rethink how much parking our communities need and who should pay for it.

A recent study at The University of Virginia titled, Analysis of Commuter Benefit, by Hamre & Buehler, interviewed 4,630 full-time employees from Washington D.C. The study surveyed employees' likelihood to utilize alternate modes of transportation, rather than use of personal vehicle which requires parking, based on the perceived benefit provided by both modes of transportation. The results of this study our summarized below:

BENEFIT LEVEL	FINDINGS
No type of commute benefit	76% Responded they would drive alone, & 22% consider transit
Free parking as a benefit	97% Stated they would drive alone
Train or bus benefit only	76% Would likely use transit
Both free parking & transit	83% Responded by stating they would likely drive alone

FREE PARKING = MORE DRIVING

Analysis Summary

"While benefits for alternatives to driving are associated within individuals choosing to walk, cycle, and ride public transportation, free car parking is associated with driving, and the joint provision of free car parking along with these other benefits may blunt the efficacy of efforts to get commuters to walk, cycle, and ride public transportation."

By introducing paid parking and a program for managing it, restraining the supply of parking, implementing fees to park, drivers will be gently encouraged to use more sustainable methods of transportation. The Parking Division's objective in review of this data is to endorse the need to reduce parking demand through fiscally responsible methods. By so doing, the Division helps the City reduce the burden on city residents by becoming a fiscally self-sustaining operation, by improving our local environment through reduction of carbon footprint, improves the services available to parkers customers, and ensures the appropriate levels of parking space turnover so that customers always have opportunities to easily honor our merchants.

One has only to observe a flustered driver, desperately trying to park his car when there is no parking to be found, on order to see that we do not always act in accordance with the rationality principles – Karl Popper

RECOMMENDATION BY THE PAC

Since inception of the Parking Advisory Committee the members have reviewed many articles, studied various opinions of urban development, transportation, and parking experts. The committee members have also cascaded their findings and ideas with the community constituents, who have echoed their sentiments and thoughts in committee planning meetings. The PAC members have developed informed opinions about how to proceed with a strategic plan that acknowledges the effects that parking and its congestion causes on the environment. They understand the need for sustainably smart programs that benefit the community. They desire to enhance parking services through improved customer focus and communication, and to achieve fiscal sustainability for the parking program.

It is for these reasons, collectively, the Parking Advisory Committee unanimously, and most importantly, recommends the implementation of on street meter parking. Secondarily, the committee recommends implementing off street paid parking, after the successful implementation of the on-street program. The Parking Committee is not recommending the program as a means to solely generate revenue, rather to create the appropriate uses of on street parking that will establish a natural and judicious use of this vital city asset.

The Committee's recommendation for the initial implementation of a paid parking program is to:

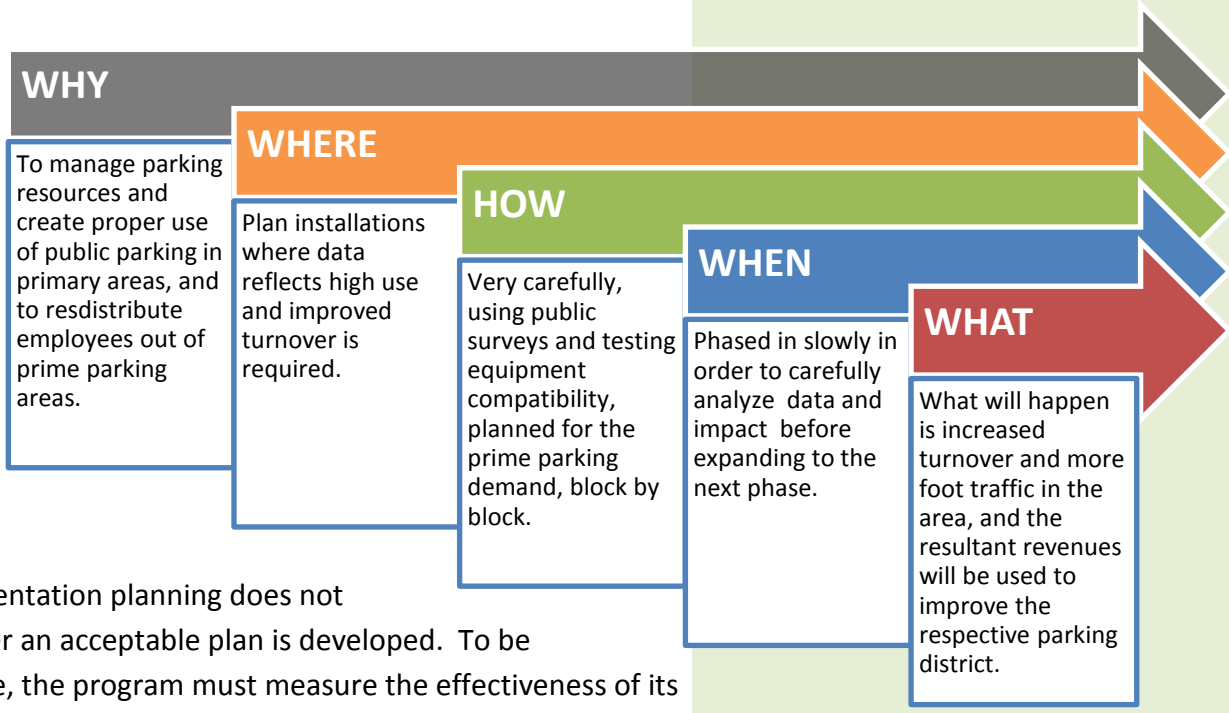
- Keep the program simple.
- Locate it in highest demand areas, and do not expand system without adhering to the program's Guiding Principles.
- Incentivize appropriate use of resources by charging more for the highest demand areas/periods.
    - Establish Progressive Pricing program in limited form, and condition pricing by the most desired spaces.
- Provide flexibility for patron decision making and length of stay in district.
- Provide financial return to the affected district(s).

- Develop a plan of expansion that adequately address all districts, but only after establishing positive history.
- Fully test, and demonstrate, capability and community compatibility of any new technology.

Upon receiving the City Commission's approval, the Parking Division will prepare a comprehensive plan for implementation using the stated Vision and Guiding Principles as the core foundation.

Implementation Planning

It is critical that a collective voice understand and support the efforts of any implementation plan. Parking programs are not always intuitively understood, and so the Parking Division must take every opportunity to extend a voice and educate those about the reason why the program is executed and what greater purpose it will serve in the community. For this reason, extending the commission of the Parking Advisory Committee is paramount. The PAC can provide invaluable assistance in planning, gaining public feedback, demonstration and selection of the equipment testing, as well the follow up evaluation of the program. Fundamentally, the program must address the following:



Implementation planning does not end after an acceptable plan is developed. To be effective, the program must measure the effectiveness of its outcomes while continually re-evaluating and refining the plans and processes. Once analytics identify, as example, a reduction in utilization, then process would proactively make changes based on smart decision-making and adjust accordingly.

Preliminary Action Planning (draft)

Phase 1 – Initial Planning	**Within 4 months**	1. Utilizing parking metrics, we will identify potential meter installation units, phasing implementation in small segments. a. Identify areas of highest demand, that will enhance parking accessibility the most, and develop a secondary range of highest demand b. Develop initial meter implementation and rollout schedule, garage paid parking, followed by subsequent rollout plans for peripheral areas. c. Identify best case target to include low cost garage parking option 2. Working with PAC, develop a task force to help evaluate equipment selection and testing. a. Identify potential meter equipment and schedule public in field-testing and demonstrations. 3. Develop proposed pricing structure for on street and off street parking locations 4. Create criteria of success using data driven metrics, to be used prior to any expanding the program. 5. Report to City Commission at the completion of Phase 1
Phase 2 – Logistical Plan	**Within 5-9 months**	1. Identify funding source for acquisition of parking equipment. 2. Develop RFP and solicit vendor equipment, interview, test, and complete agreements. 3. Review alternative transportation & parking strategies using public workshops and refine program objectives. 4. Logistical planning for installations, peripheral service requirements 5. Develop effective marketing plans to engage community 6. Report to City Commission at the completion of Phase 2
Phase 3 - Installation	**Within 10-15 months**	1. Install meters in prescribed areas using the rollout plan. 2. Begin data collection and analyze equipment effectiveness against the operating criteria. 3. Continue refining city-wide meter rollout and garage parking plans, target dating next installation schedules. 4. Report to City Commission at the completion of Phase 3
Phase 4 - Report	**15 - 24 months**	1. Continue analyzing meter performance and effective parking supply. 2. Post installation focus group meetings. 3. Report to City Commission on a quarterly basis the meter parking performance metrics. 4. Initiate additional phasing plans

"If you always do what you always did, you will always get what you always got." (Albert Einstein).

MOVING AHEAD

Additional City Parking

As the demand for parking expands in every parking district the need to anticipate future, parking demand increases. The Parking Division will perform space utilization surveys bi-annually and work closely with associated city departments to help identify the potential increasing demands that may require additional public parking. Before building new facilities, every effort should be made to optimize existing resources.

A properly balanced parking system avoids creating an excessive supply of parking. Any expectation that the City must provide an endless supply of parking spaces where needed, directly conflicts with the Vision of the parking program. According to author Todd Litman, Parking Management Best Practices (2006), Management solutions should be used whenever they are more cost effective than adding more parking supply. An oversupply of parking spaces can:

- Cause negative affect for livable, walkable communities.
- Dis-incentivizes appropriate driving speeds and behaviors.
- Drivers to "hunt" for the best space, further congesting high demand area.
- Increased environmental waste and runoff.
- Unnecessary constructions costs.
- Costs to maintain spaces are borne by everyone, not just user.
- Encouraging sprawl development.
- Delays a cultural shift in using multi-modal modes of transportation.

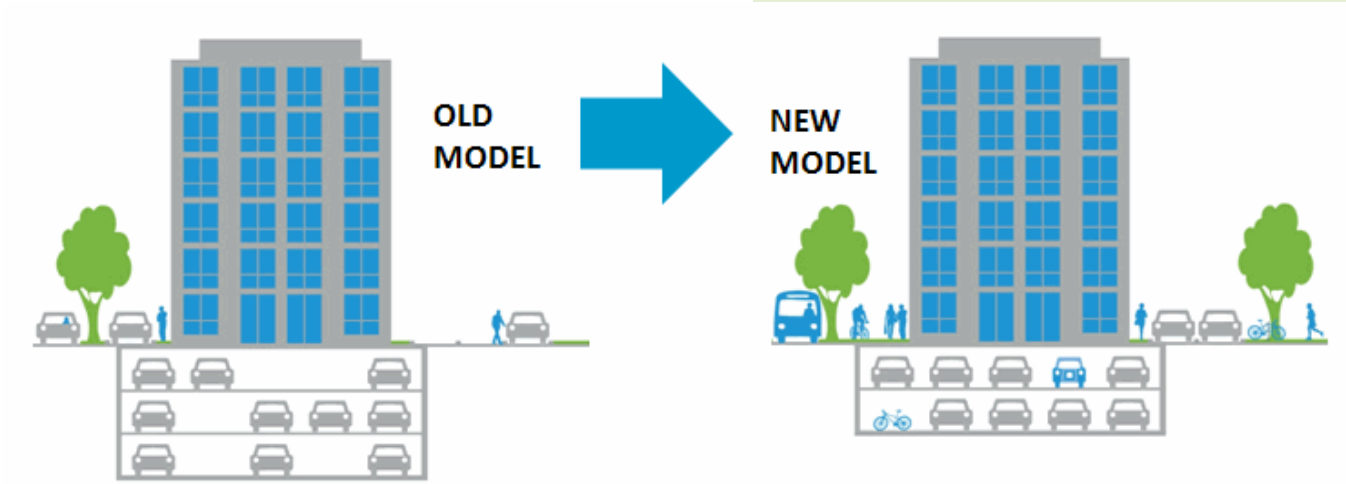
Recommendation: Consider use of parking maximums instead of minimums. According to Shoup, The High Cost of Free Parking, this is the surest way to decrease pollution, congestion, and energy use.

To fully realize the value of parking, city planners need to address a number of essential questions: How much parking should be offered? Where it should be located? How much should it cost and/or what kind of restrictions should be placed on parking spaces? How much can or should the city be willing to spend to provide parking for the public?

Donald Shoup has called parking minimums a 'fertility drug for cars'. By forcing extra parking supply and hiding and dispersing it's costs, the conventional approach lowers the perceived cost of vehicle ownership and use, thereby generating traffic growth.

A more sustainable approach may be to determine there are levels of acceptable limitation of parking space expansion, and instead promote the use of mobility solutions within highly dense areas of each district. The City's Bayfront parking lots, with a parking capacity of 611 spaces, is an area where capacity limitations create responsive planning. To make smart decisions, we must ask whether increasing the parking capacity helps achieve the long-term objectives of the Parking Program and City's Master Plan. Considering that fundamental question before taking any action supports the objectives of the Parking Program's Vision, Mission and Guiding Principles, and the City of Sarasota's Mobility Master Plan. However, this notion of limiting parking space capacity does not ignore the proper application for increasing capacity when needed, but recognizes the long-term inefficiencies with building too many parking spaces within a core urban area.

Perhaps using by using an open view to setting the parking requirements in the city could allow us to right-size the parking spaces to the surrounding demand and project. With this approach, planners can help create a better balance between real need, usage, and shifting demand to multi-modal transportation modes. There has been significant research done in determining the right size for parking. The most current modeling tool is found at: *Right Size Parking Modeling –*

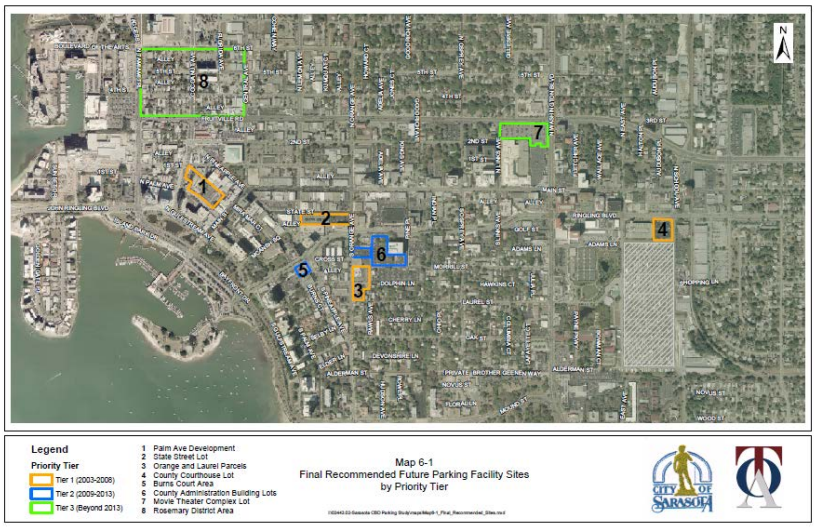


By simplifying and reducing the parking minimums, alternative modes of transportation are effectively encouraged. For more information visit http://metro.kingcounty.gov/programs-projects/right-size-parking/objectives.html

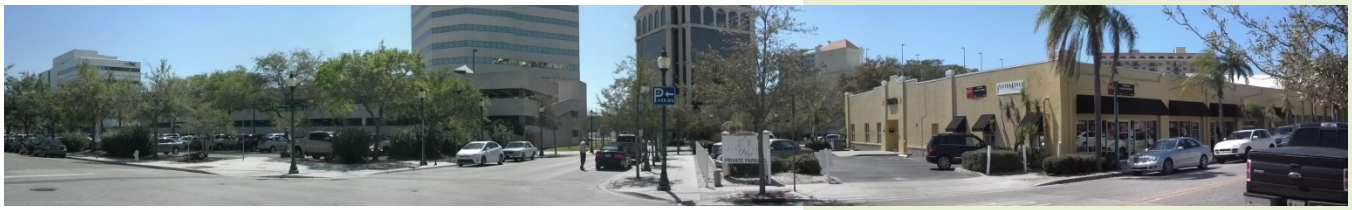
The Walker Parking study, and our own survey on parking utilization, has identified key districts in town that are experiencing the highest levels of use. Additional parking capacity must be considered for these areas to help improve the economic vibrancy. Planning must also include an integrated plan for transportation in these districts so that less reliance on using parking spots and the correct balance of parking space count and multi-modal transportation use is realized.

Current locations under evaluation:

- St. Armand's Key
- Southside Village
- Bayfront Park
- Rosemary District
- Burns Square
- Lido Beach



Master Parking Plan, 2005 Suggested Priority Parking Expansion Locations



Future Development of Parking Standards & Engagement of Resources

The Parking Division's Vision and Mission Statement, with the Five Guiding Principles provides a basis for future engagement of the supply of parking and the process to use for evaluating the programs. The Parking Division should endeavor to consider the use of industry's best practices in consideration of its objectives, yet always remaining Sarasota-centric in application and practicality.

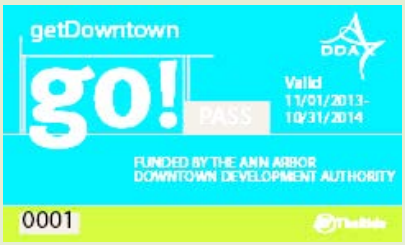
Resources should be focused toward broadening accessibility to alternative transportation and "share" company opportunities. The City of Sarasota will strive to interest private operators of bicycle rentals systems, car sharing (ZIP Car), carpooling programs, and bus passes that offer employees highly discounted opportunities for transportation. These programs will help defer the use of cars by providing in town residents and county based employees an inexpensive and convenient resource for moving in and around the town.

Parking must continually strive to balance the goals of the community, and hold a broadly mounted servo that identifies issues affecting each parking district. Policy makers need to recognize that solutions may be effectively resolved by granular block-by-block review, and solutions can be driven at a district level. Ultimately, to better address needs of the community, the Parking Division must use thoughtful well-planned management process that encourages public compliance and self-perpetuates success in customer service.

Recommended Objectives:

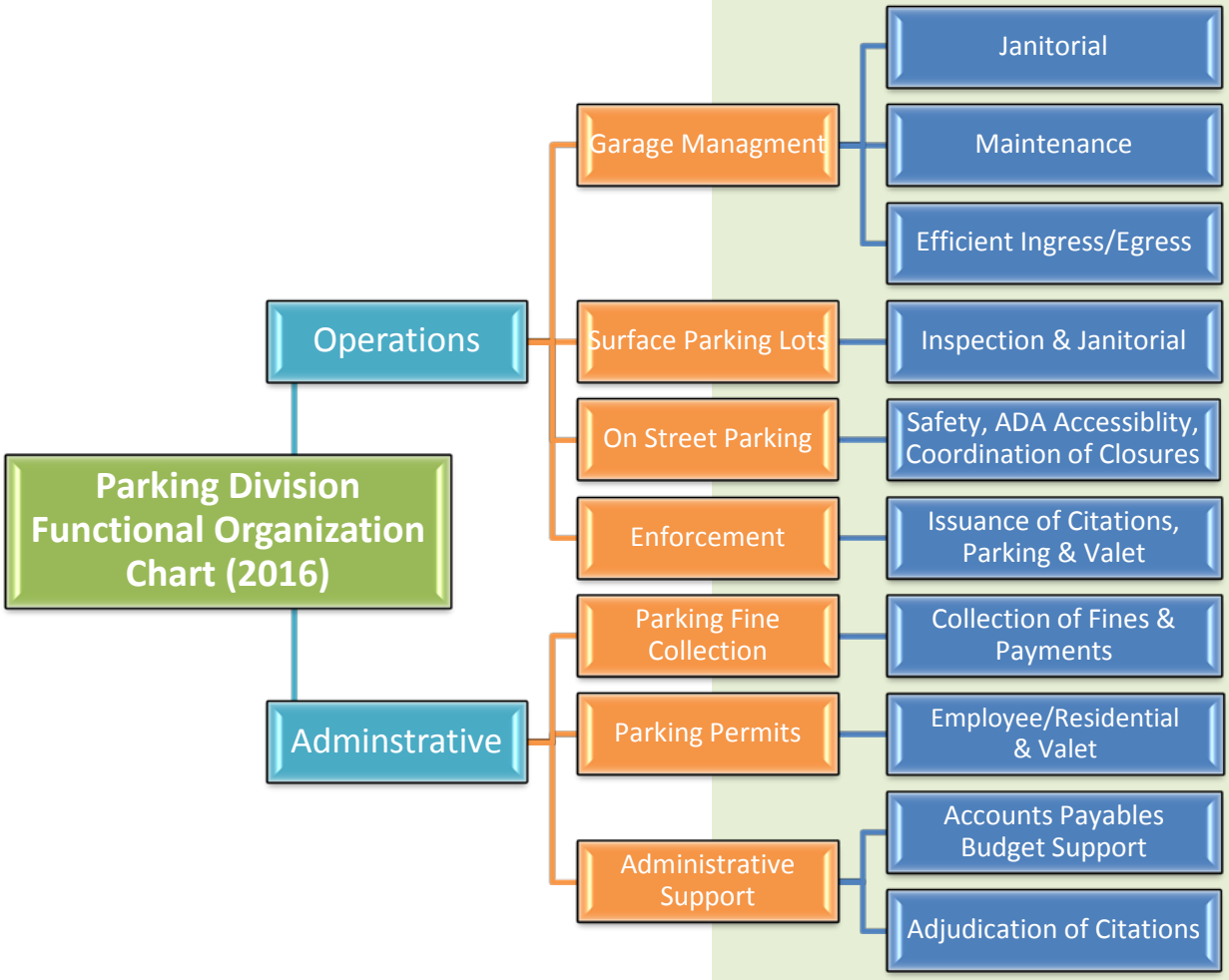
- Using Industry Best Practices – Considering Community Expectation and level of service.
- Evaluating active needs should be done first by Demand, Location, Time, Pricing, and Supply.
- Frequently perform parking surveys.

- Review potential parking issues of future private development and ensure proper preparedness and balance of public demand.
- Engage development of a downtown commuter pass using alternative transportation modes like go pass – get downtown, State of Florida Commuter Services program, and mitigate use of demand for parking spaces.



Organizational Considerations

A well designed management structure is perhaps the key to long-term success of the parking management program. The Tindale-Oliver & Associates, Inc., Downtown Parking Master Plan, 2005, recognized that "the parking related functions were fragmented departmentally." "This type of organization does not lend itself to the effective and efficient planning and operation of a parking program." "The most effective and efficient method of managing a municipal parking program is through a sole source responsibility center, a consolidated structure and approach for system management." Structuring a management system by which decisions can be adequately reviewed, metrics considered, questions answered, and operations planned and monitored contributes to successful programs.



Parking Division's 2016 Function Organizational Chart demonstrating the broad range of requirements that require citywide integration and key communication with other departments.

If outdated and unproductive processes for evaluating, communicating, and implementation are utilized, then the full level of integration for these services will not be achieved. The parking management structure should become an integral part of the organization by gaining a seat at the table, and thereby, developing untethered access through the entirety of its channeled support.

Parking management reaches a broad range of peripheral City interests. Ensuring the parking management program has a seat at the table means giving it more extensive opportunity to review how parking and transportation become impacted in the early stages of any given project.

Parking initiatives that do not take into consideration potential changes due to construction, right of way changes, and future projects, are destined to overlook critical data that could otherwise create important synergies and lead to achieving a Safe, Smart and Sustainable parking system.

SUMMARY

Parking Matters, in every way - that is too often unnoticed. It is time to consider the benefits of an advanced parking management program and demonstrate the benefits of Smart, Safe, & Sustainable parking in our community. The City of Sarasota's endeavor to address how parking is managed over the last several years has been studied by users, residents, developers, and professionals community-wide. All of the combined research performed to date, contains volumes of recommendations that consistently directed the city to implement sound parking management programs. Today, The Citywide Strategy for Parking Management is a locally authored document by local community leaders and staff that have deliberated the pros and cons of using modern parking management practices. It provides a high level review about how to manage the important elements of parking management, and specifically addresses how to proceed using paid parking to manage the parking resources.

Growth continues to be a blessing to our community and an indication of its desirability. However, the infrastructure to support the growth is outpacing the city's response for smart parking and resource management. Why is testing no longer a worthy topic of discussion on how to use these systems? Consider, one thousand new apartments, one thousand new condominiums, and one thousand new hotel rooms, Bayfront 20/20, and more in the process of development. Instead of testing parking concepts, it is time for the City to take action and deploy smart parking programs that benefit the community by helping place feet on the sidewalks, reducing the reliance of subsidies by the Parking Fund. Instead, the City should shift the expense of operating from the citizen tax rolls and place it on the users of the parking system.

Accepting the recommendations in this document means the full integration of the Parking Division's Vision, Mission, and 5 Guiding Principles. Accepting the recommendation provides staff with a template for decision-making, progress, and smart management of one of our important urban assets - parking. Accepting the recommendations in this document is a prelude to proactive planning by the Parking Division and the beginning of many opportunities to publicly outline plans that will be vetted, and presented with the City Commissioners for approval. Accepting the recommendations in this document allows staff to address questions in a consistent manner and protect the community from taking unsound actions that have large effect on how we park cars, travel, and walk around our wonderful parking districts. An acceptance of these recommendations ensures a process of review, public feedback, and on-going use of metrics to analyze the system's performance and effectiveness.

Over the past few years, so many individuals have commented that moving forward with a citywide parking strategy should be held back until we understand the impact of the UTC mall. Others have asked to wait and see what other communities are doing to manage on-street parking developments. The content of this document reports about various programs and demonstrates how positive results can be achieved using the management practices of paid parking.

Cost effective parking management programs can usually reduce parking requirements by 20-40% compared with conventional planning requirements for more lots and garages (Todd Liman, Victoria Transport Policy institute, July 2012). Reducing the need for more parking spaces with progressive parking management solutions helps place in to motion the long term alternative transportation objectives established by the City, and creates positive revenues streams that can be reinvested into the parking infrastructure.

The use of the industry's best practices and management solutions represent a change from current practices and so various obstacles must be overcome to advance our parking management program. Current practices are based on the assumption that parking should be abundant and provided free, the cost of which is borne by our City residents, and yet free to others. As public officials, planners and administrators, we will need to change the way they think about parking problems and their solutions using the principles outlined in this document. Integrating experienced parking management programs and strategies that benefit the community, aimed at achieving the City's goal for quality urban life, walkable communities and enhanced transportation systems is what implementing professional parking management is all about.

ACKNOWLEDGEMENTS

The document is the result of significant input by our community leaders, from study and excerpts from other professional studies produced in municipalities across the country, after discussion with industry counterparts. Mostly, this document is the result of the members who now serve or have served at one time on the City's Parking Advisory Committee. The Committee has taken unprecedented effort and time in understanding the specific issues that are impacting the Sarasota community but also educating themselves about the parking industry.

Parking Advisory Committee - Past and present members:

Chris Gallagher	**Marty Rappaport**	**Steve Queior**	**Eileen Hampshire**	**Carl Shoffstall**
Belinda Coffrin	**Bob Easterle**	**Pat Westerhouse**	**Thomas Delong**	

Appendix

Push - Pull, 16 Good Reasons for Parking Management; www.pus-pull-parking.eu

A parking policy typology for clearer thinking on parking reform, International Journal of Urban Sciences; http://www.dx.doi.org/10.1080/122659.4.2014.927740

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Contemporary Approaches to Parking Pricing, U.S. Department of Transportation, 2016

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Professor Don Shoup, B.E., Ph.D. Economics

Jeff Speck, A.I.C.P, C.N.U.-A., Leed.AP, Hon. ASLA, Author

Andres Duany, A.I.C.P, Author

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Adaptive Parking Reform; http://www.renventingparking.org

King County, Washington www.rightsizeparking.org

PUSH & PULL

16 Good Reasons for Parking Management

push-pull-parking.eu

PUSH&PULL - “Parking management and incentives as successful and proven strategies for energy-efficient urban transport”

The main objectives of **PUSH&PULL** are to:

- Save energy through a modal shift from car to other more sustainable modes;
- Help local economies by encouraging a more rational and managed approach to parking and helping cities to save money by avoiding the costs of construction of additional parking; and
- Build the capacity for followers who want to implement a similar system with the knowledge required to help to alleviate parking problems, and build political arguments to support them.

The project includes implementation of parking and mobility management in 7 cities and 1 University. All implementers will set up the core-funding mechanism to use money gained from parking to finance sustainable mobility.

This publication was developed by collecting information from existing studies and publications by project partners and third parties, then re-wording texts and adding additional text. We kindly invite you to use and copy the contents of this brochure. When you use and disseminate material from this brochure we ask to refer back to the website push-pull-parking.eu

This brochure has been developed and written by the following persons from the **PUSH&PULL** consortium:

Tom Rye, Giuliano Mingardo, Martina Hertel, Jörg Thiemann-Linden, Robert Pressl, Karl Heinz Posch and Marta Carvalho.

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Edition: January 2015

EDITORIAL

Since private cars are in use for on average only one hour per day, it is easy to understand why stationary traffic needs special attention. But construction of large parking lots at destinations is expensive and often environmentally contradictory. The smarter approach is to deal with parking in a more efficient way – parking management! There are very few areas in urban development and transport that could bring so many benefits for quality of life, behaviour change and modal shift than parking space management.

But parking is seldom discussed rationally in public debate. It is much more often a purely emotional judgment by citizens and journalists that prevents decision makers from implementing an intelligent and sustainable urban transport policy.

This brochure provides the knowledge required to build sound, political arguments to help to alleviate parking problems and in so doing to support sustainable transport. It should strengthen the position of politicians, decision makers and multipliers such as journalists in the process of taking what may be, at first glance, unpopular, but in fact rational and sustainable decisions to manage on- and off-street parking.

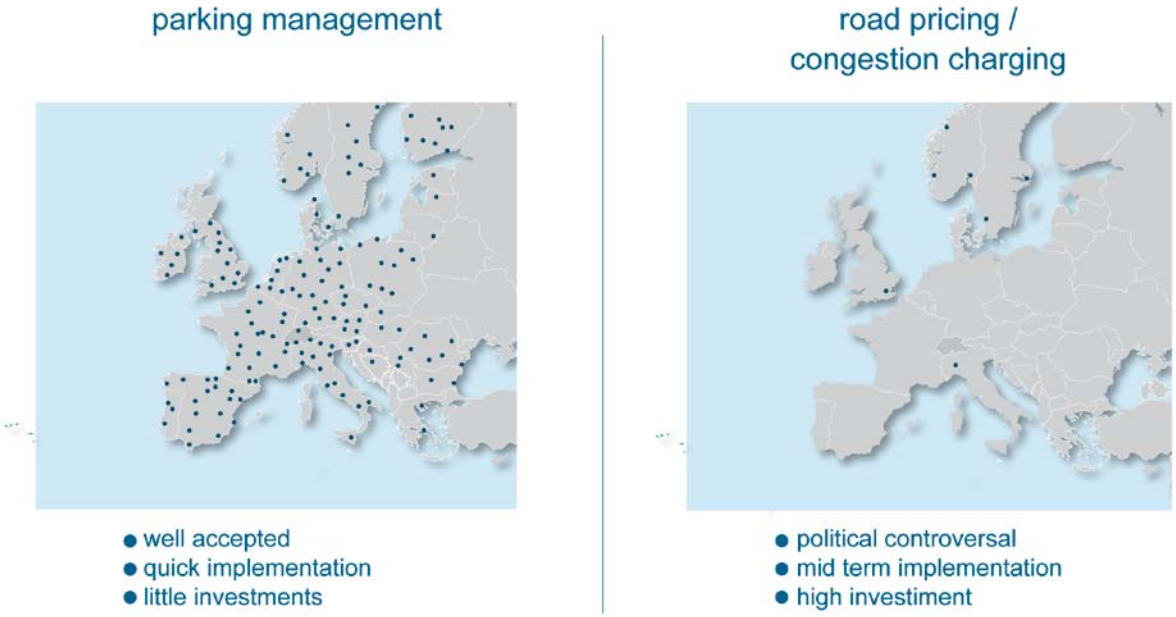
The arguments are developed in the format of facts and figures with a picture / diagram and an explanatory text that it is easily understood and quickly summarises the key arguments. For more complex issues, links to more detailed descriptions are provided.

The **PUSH&PULL** project aims to improve urban mobility in European cities by means of parking space management combined with mobility management measures. By introducing paid parking, increasing parking fees, reducing or restraining parking supply or implementing comparable measures, car drivers will be “pushed” to use more sustainable transport. At the same time, the income generated from parking space management can be used to promote alternatives, thus “pulling” or attracting users towards public transport, walking, cycling and other sustainable modes.

This approach is an innovative one in several cities in Europe that has high potential for transferability to other cities. The potential to raise revenue for cities from such a core funding mechanism – revenue that can be used to finance measures to encourage alternative forms of transport - is important especially at a time of economic crisis.

Robert Pressl
Coordinator of **PUSH&PULL**

Comparison of push measures



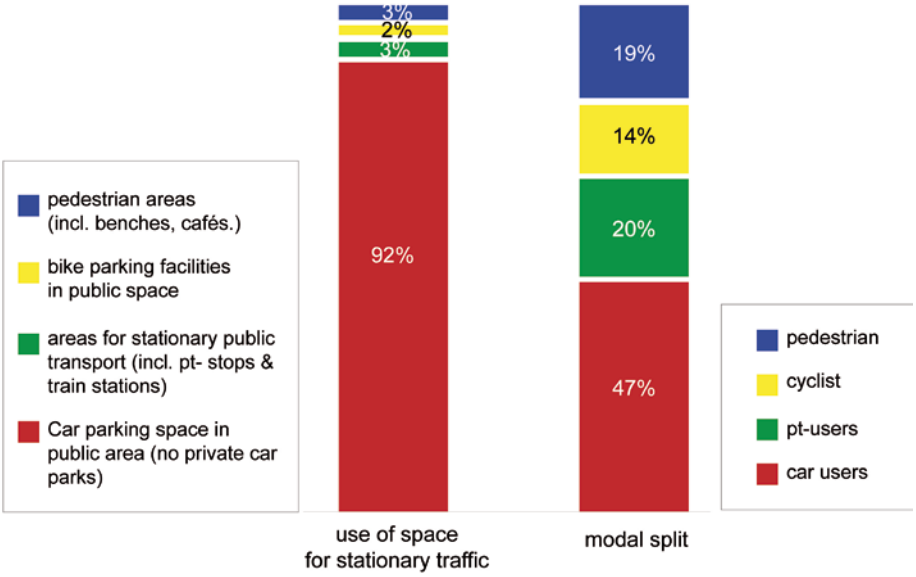
The fact is: Parking Management is key to managing urban mobility.

Virtually every car trip ends in a parking space. Accordingly, managing parking spaces means managing the demand for car use and congestion. Compared to other transport policies aimed at managing car use, parking presents two clear advantages:

- Parking management does not usually require large investments, such as new roads or the extra public transport supply, and it can thus be realized in a relatively short time;
- Some kind of parking management can already be found in almost all larger towns and cities in Europe. This makes the public acceptability of parking management much greater than new ways to manage car use, for example a congestion charging scheme.

A more detailed version of this argument can be found at:
http://push-pull-parking.eu/docs/file/20150204_push_pull_a4_en_extended_argument_1.pdf

Use of space for stationary traffic and modal split in Graz, Austria



Source: Austrian Mobility Research 2011 and City of Graz 2013

The fact is: Public space has a high value and therefore should be paid if used for parking.

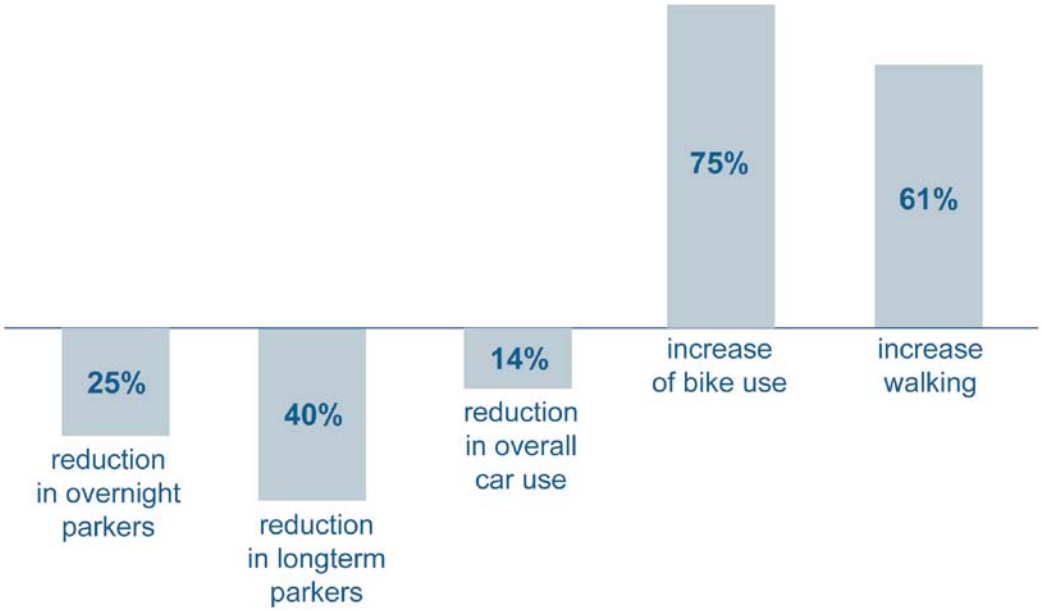
Each parking space consumes from 15 m^2 to 30 m^2, and the average motorist uses 2 to 5 different parking spaces every day. In dense European cities, a growing number of citizens began to question whether dedicating scarce public space to car parking was a wise social policy, and whether encouraging new buildings to build parking spaces was a good idea (Kodransky and Hermann, 2011, IDTP).

Public space in dense built-up areas has a higher value from a social, economic and environmental view if it is used for something other than parking cars free of charge. Like many other rare collective goods this space should be managed by price. Research has shown that e.g. providing green space could have a bigger positive impact on the value of a city house than providing surface parking. So, in general no public space should be given over to free parked cars in city centres.

A survey in Graz, Austria, on the use of public space by stationary traffic showed that 92% is used for parking cars (private parking and garages are note included in this!). Only 2% is for bicycle parking, 3% are areas that could be summarized as being for pedestrian use (included are benches, street cafes etc.) and 3% is dedicated to public transport (incl. PT stops and train stations). This survey shows the incredible privilege of the use of public space for parking cars in relation to the actual modal share.

See also: Case Study on “The Historical Compromise – The parking supply cap in Zurich, Switzerland” at http://push-pull-parking.eu/docs/file/cs07_push_measures_supplycapzurich.pdf

Results of active parking management in Munich



Source: Kodransky and Hermann, ITDP, 2011

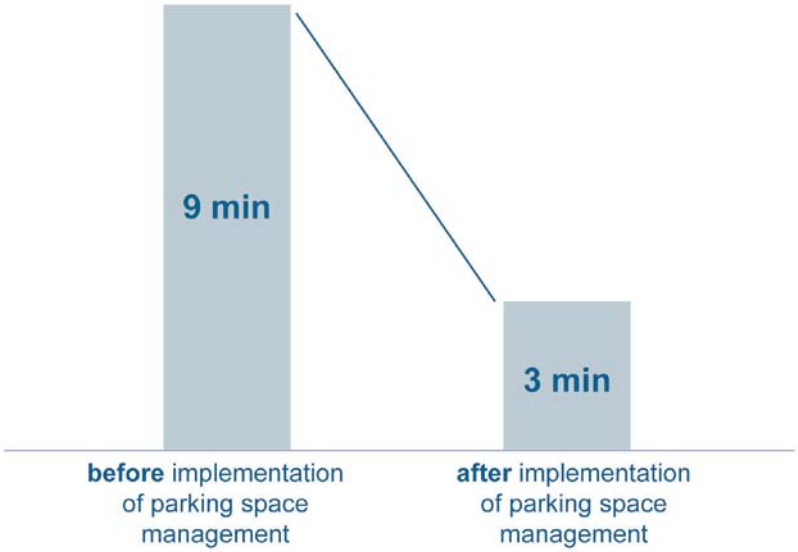
The fact is: Parking management contributes to a better modal choice and therefore quality of life.

A policy of excessive parking supply contributes to traffic congestion and hinders accessibility for all: pedestrians, cyclists, public transport users or car drivers. Despite the provision of additional parking supply in cities over many years, traffic congestion has worsened; this clearly shows the need for parking management. Effective parking management strategies are the smart way to deal with limited accessibility and scarce public space.

In the beginning of the nineties the city of Munich started to focus on parking management as a way to reduce car use in the city centre. At that time congestion and long-term parkers were recognized as key issues affecting quality of life. Several measures were introduced; among others two residential neighborhoods were selected to reduce cruising for parking (driving round, looking for a vacant space). After carefully studying the right mix between residential and visitors parking, active parking management was introduced. A year later the results were astonishing: a 25% reduction in overnight parkers, a 40% reduction in long-term parkers and cruising and illegal parking almost eliminated. In 2008, after almost a decade of active parking management, in the whole inner city car use was reduced by 14%, bike use increased with 75% and walking by 61% (Kodransky and Hermann, ITDP, 2011).

Average time to find a parking space

Vienna, districts 6-9



Source: COST 342, 2005

Fact is: Parking Management leads to less park search traffic!

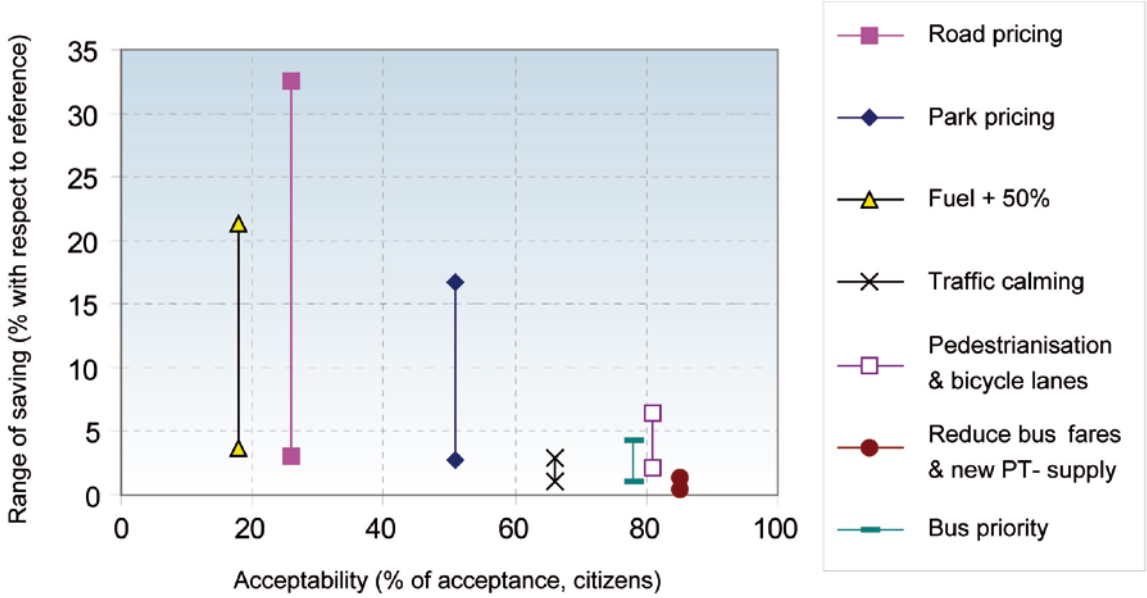
Cruising for parking (parking search traffic) leads not only to additional costs for drivers (extra time and fuel) – but it has also negative externalities for society such as extra pollution, noise and accidents. Kodransky and Hermann, ITDP, 2011 estimate that up to 50% of traffic congestion is caused by drivers cruising around in search of a cheap parking space. Evidence suggests that effective parking management with economic mechanisms that harmonize on-street and off-street parking fees can considerably reduce cruising for parking.

A before-after evaluation in Vienna's districts 6-9 shows a decrease in parking search traffic from 10 million passenger car km per year to 3.3 million km, that is, two thirds. While before the introduction of the management of parking places parking search accounted for 25 % of the total volume of traffic, it now accounts for only 10 %. It was ascertained in the districts 6 to 9 that the average time it takes to find a parking place has been reduced from about 9 minutes to barely 3 minutes after the implementation of parking space management (COST 342, 2005).

A more detailed version of this argument can be found at:
http://push-pull-parking.eu/docs/file/20150204_push_pull_a4_en_extended_argument_4.pdf

See also Argument "Striking the right balance is what brings success!"

Fuel saving vs. public acceptability of measures



Source: EU-project: PORTAL 2003

The fact is: Parking management has a good impact – acceptance – ratio!

Paid parking - a crucial component of parking space management - has the best impact-acceptance-ratio in a comparison of a range of different measures to cut transport energy consumption and save fuel.

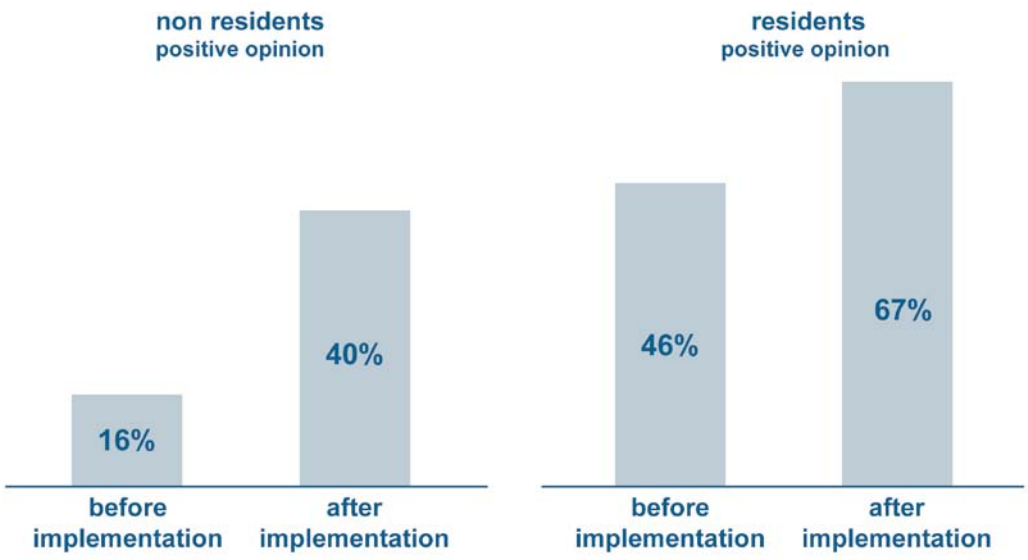
Although for an example a doubling of fuel prices or road pricing / congestion charging have bigger impacts, their acceptance among citizens and stakeholders is limited. Reduced or even zero fares on public transport are of course highly acceptable but their impact on saving energy or reducing car use is very low since their main impact would be to convert cyclists and walkers to public transport.

In comparison paid parking is highly effective and moderately acceptable.

Another survey on the impact of these kind of measures shows that doubling parking fees reduced car use by 20% while a similar increase in public transport frequency was predicted to only decrease car use by a meagre 1-2% (Kodransky and Hermann, ITDP, 2011).

Acceptance of parking space management

Vienna, district 6-9



Source: COST 342, 2005

The fact is: People usually moan before new parking management is introduced but initial opposition turns to support when they realize the impacts!

Parking Management improves quality of life in cities and though they might moan when it is planned, your citizens will like it once it is implemented. Cities like Amsterdam, Copenhagen, Munich, London, Gent, Zurich, Strasbourg, Barcelona and so on have a long tradition in the implementation of parking management and the citizens benefit from this policy.

"The impacts of these new parking policies have been impressive: revitalized and thriving town centres; significant reductions in private car trips; reductions in air pollution; and generally improved quality of life" (Kodransky and Hermann, 2011, IDTP). This quote – from American researchers studying the European approach to parking management - perfectly summarizes the potential of parking management for creating better cities.

In Vienna a 'Before-After' survey shows the difference in attitudes before and after the implementation of parking management in Vienna. Summing up, the acceptance after implementation was considerably higher than before. For non-residents, those with a negative attitude decreased from 68% to 54%, whereas positive opinions increased from 16% to 40%. The positive attitude of residents increased after implementation to 67% (from 46 % before), whilst negative attitudes decreased from 34 % to 30 % (COST 342, 2005).

How do you want your city?

Source of Photo: City of Gent

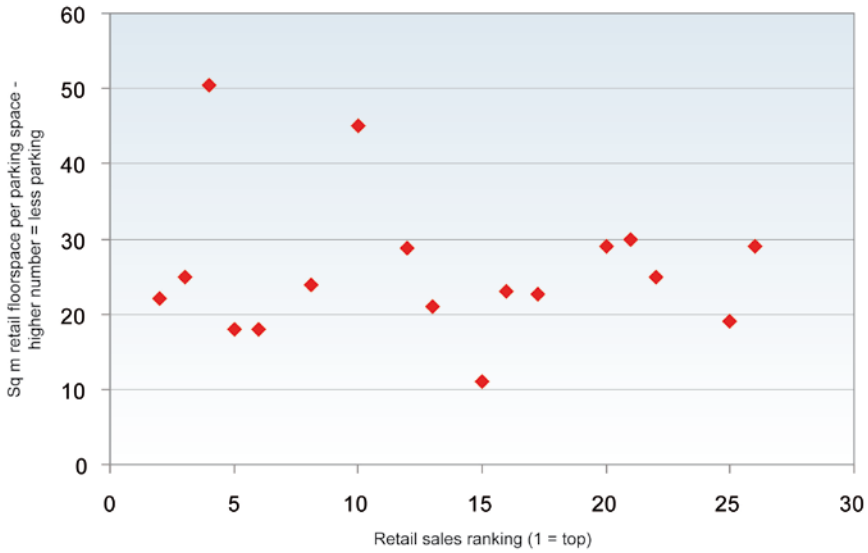
The fact is: parking management protects European historic cities from the invasion of parked cars.

Old city centres are not only important to attract tourists, but are key to local identity and citizens' pride. Virtually none of the dense old European cities were constructed to deal with a high number of parked cars. In addition to access restrictions, clear regulations and management of where to park, who may park, for how long and how much are essential to protect historical cities from an overwhelming invasion of cars and to bring about a rational use of the scarce commodity of high quality urban public space.

Within the overall framework of its urban regeneration, the City of Barcelona aimed to strengthen commercial, economic and leisure activities in the centre by implementing an integrated concept for public space. On-street parking was reduced to 24% and car reduced public space was increased. The reduction in the on-street parking supply had no influence on tourist activities, which in the period 2003 - 2007 increased (27% increase in demand for accommodation, 13% increase in tourist / leisure time activities like visiting restaurants, travel agencies etc.).

From the mid 1990s the City of Gent removed parking from streets and public spaces in its historic city centre, creating a 35 ha pedestrian zone instead. From 1999 to 2008, the city's previous population decline reversed, whilst investment per person was 20% above regional average and growth in new firms was 25% above regional average. This economic success cannot be attributed solely to the quality of life improvements flowing from conversion of on-street parking to public space, but these changes played a part in delivering economic benefits.

Retail floorspace per off-street parking space related to retail sales, GB city centres



Source: City of Edinburgh, 2005

The fact is: Parking Management will not kill your high street - it will support the local economy.

Parking in an attractive city is less important to successful shops than shop-owners think. People choose where to shop based on the range and quality of shops, and the atmosphere of the place. Parking plays a role, but it is not the main factor. Research shows that there is no (direct) relationship between the turnover of shops and the transport mode used by customers and the amount of parking spaces provided.

People who walk, cycle and take public transport to the shops visit more often and visit more shops than those who come by car.

If parking is not regulated, shoppers and visitors coming by car might experience difficulties in finding a place available close to where they want to be. When there is no parking management, parking in front of shops is often used by long-term parkers (not uncommonly by shopkeepers themselves!) instead of being available for customers. Henley is one of the many towns in UK where this is a problem; “It would be much better use of that bay if it had restricted parking in order to open it to a lot more users” is the suggestion of the Town centre manager about some of the parking in his local high street (Henley Standard, 2013).

A more detailed version of this argument can be found at:
http://push-pull-parking.eu/docs/file/20150204_push_pull_a4_en_extended_argument_8.pdf

Quality of pedestrian routes between parking garages and shopping areas

Source of Photo: Harry Schiffer - ELTIS

The fact is: User-friendly parking areas within walking distance of key locations is acceptable!

Ever increasing numbers of cars in many EU cities gives the impression that there is never enough parking space. People would like to park in front of the shops. To achieve a balance between parking needs and available spaces in shopping areas, reasonable walking distance to parking is key to effective solutions. Surveys show that well designed routes to walk from parking garages to the city centre's destination are well accepted. So the challenge is to influence the „mental map" of car drivers who almost always overestimate the time and distance to walk from parking to their final destination. Maps or signposts are a good support.

Copenhagen is a good example of a city that has reduced inner-city parking spaces by many hundreds and at the same time invested in a high quality pedestrian network and bicycle paths.

Smart use of a company's scarce real estate

Source of Photo: FGM-AMOR

The fact is: Parking Management won't stop companies investing in your city!

The City of Amsterdam has been reducing the number of parking places in the city centre since the nineties and it has some of the highest on-street parking fees of Europe. In spite of this, Amsterdam is still one of the best places to do business according to the CEOs of the largest European companies (Cushman & Wakefield, 2012).

In a survey about the business climate in the 30 largest cities and towns in the Netherlands commissioned by the Dutch Ministry of Economic Affairs, no evidence was found of any company relocating because of lack of parking (Ecorys, 2005).

The City of Oxford, England, stopped allowing parking to be built with new buildings in its city centre in 1973. It remains a highly successful city economically (Oxfordshire County Council, 2005).

Investments in bicycle parking that use space formerly occupied by car parking serve a much bigger number of employees by using the same or less space. This is a smart use of a company's scarce real estate.

A more detailed version of this argument can be found at:
http://push-pull-parking.eu/docs/file/20150204_push_pull_a4_en_extended_argument_10.pdf

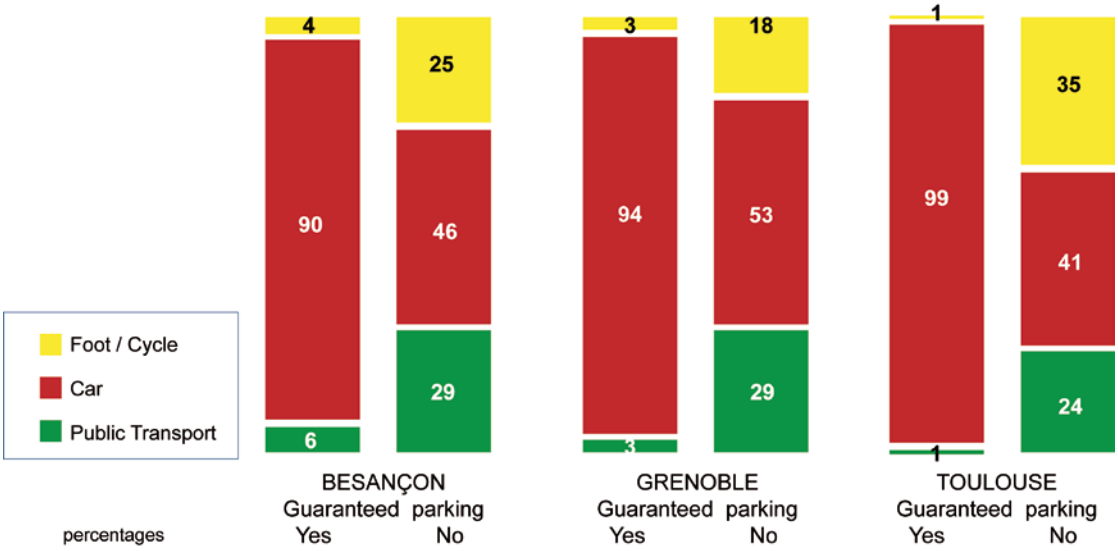
See also the case study on the Nottingham Workplace Levy at

http://push-pull-parking.eu/docs/file/cs02_push_measures_nottinghamwpl.pdf

See also the case study on the Parking Management System at the Technical University in Graz at http://push-pull-parking.eu/docs/file/cs05_push_measures_tugraz.pdf

Influence commuter trips!

Employees with/without guaranteed parking in France



Source: Citadins face à l'automobilité - a compared analysis of the local communities of Besançon, Grenoble, Toulouse, Berne, Geneva and Lausanne, 1998.

The fact is: Guaranteed parking spaces at workplaces influence modal choice significantly.

When deciding on the travel mode at the origin of the trip – often at home - the (expected) availability of a parking space at the destination is a driving factor for decision. A guaranteed parking space directly at the work place is, for example, a crucial factor for employees to decide to use their car for the home to work trip. Surveys in different French and Swiss cities show that employees who have a guaranteed parking space at their work place use their car to travel to work far more than those who have no or limited parking.

Limitation of free parking or availability only of paid parking spaces or any other method of parking space management will lead to a significant change in the travel behaviour of car users.

Stationary traffic also causes risks!

Source of Photo: Robert Pressl

The fact is: Parking management contributes to road safety!

Due to their small physical size children face a high risk of accidents at junctions or pedestrian crossings where cars are parked too close – even at low vehicle speeds in housing areas with dense parking on both sides of the street. Parking management and especially the connected enforcement of regulations and laws make a major contribution to road safety by ensuring good visibility for pedestrians at crossings and all road users at junctions. In high density urban turn of the century neighborhoods, where the streets are ‘overused’ by parked cars, even the fire brigade argues for proper enforcement to ensure access when there is a fire.

13 TRUST IS GOOD, CONTROL IS BETTER!

Parking violation is not a trivial offense!

Source of Photo: Foto Wolf

The fact is: Enforcement of parking violations is necessary – and not harassment of car users.

Enforcement of regulations by staff – which creates new jobs - or with cameras is essential to avoid inconsiderate and dangerous parking and simply to ensure that parking management works. Other transport users benefit – emergency vehicles or delivery vehicles, but also cyclists or people with reduced mobility, in wheelchairs or with walking frames, or mothers with baby buggies. Enforcement to protect society from violation of parking regulations is highly accepted. Placing physical obstacles in streets (such as bollards) to prevent parking violations is only a second best solution because it wastes public space. Missing obstacles could be understood as „free parking space everywhere there is no obstacle“ in local mobility culture.

Parking enforcement is necessary to guarantee that car users follow the parking regulations set by the municipalities. In the past the police were supposed to do this job but experience shows that better results can often be obtained by outsourcing of enforcement to private companies, no matter if this is by wardens who patrol the streets or by more technical means such as license plate number recognition with scan cars.

MAXIMUM NOT MINIMUM STANDARDS FOR PARKING IN NEW BUILDINGS!

14

Parking Standards

The fact is: Parking standards can have a positive impact on housing and other real estate projects.

Very often the costs for building a parking space in a garage or underground can be between €20,000 and €40,000. In many urban (re)development project parking plays an important role, especially from the point of view of financial feasibility of the project. Parking requirements – also known as parking standards or parking norms – are a fundamental issue for real estate and the key to secure the link between urban regeneration and sustainable mobility. Maximum parking standards should take the place of minimum standards, especially in areas where there is effective control of on-street parking.

Parking standards could be related to accessibility of the area at least by public transport. If an area is well served by public transport less people using the development area need a car. Minimum parking requirements can also be eliminated in order to stimulate sustainable growth, as recently happened in Sao Paulo (ITDP, 2014) or already for a number of years in Amsterdam, Zürich, in some parts of Paris or in much of the UK.

A more detailed version of this argument can be found at:
http://push-pull-parking.eu/docs/file/20150204_push_pull_a4_en_extended_argument_14.pdf

15 STRIKING THE RIGHT BALANCE FOR SUCCESS!

Rates depend on policy and objectives

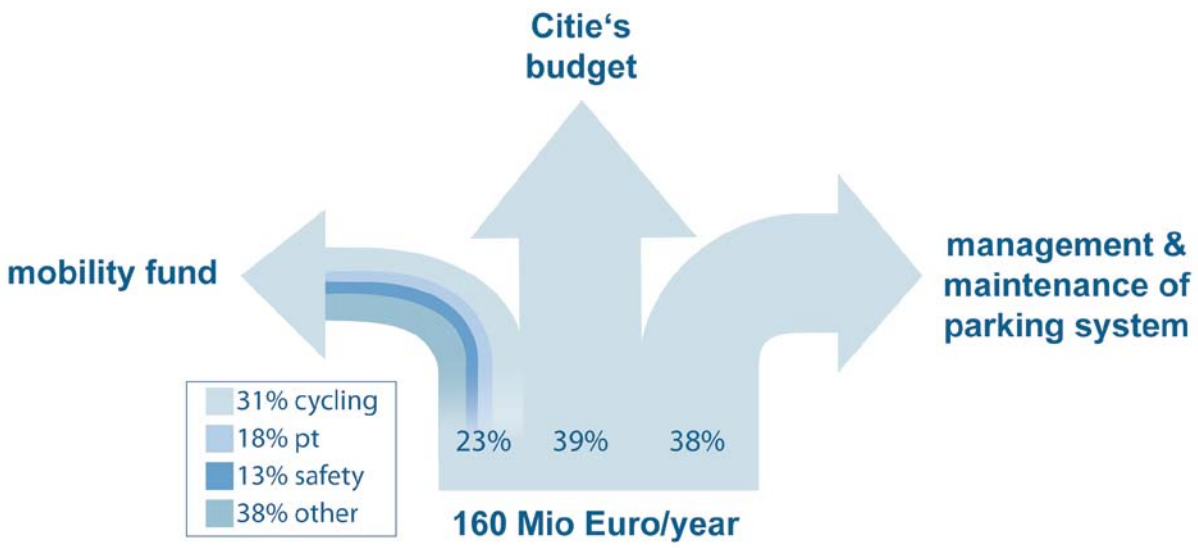
Source of Photo: ©iStock.com/faberfoto_it

The fact is: Correct rates, prices and appropriate fines are key to the success of parking management.

Long-term investment in parking garages – whether private or public – in most cases has been a core part of the parking policy in many areas. In theory, rates should be well balanced – in the garages as well as on-street. But the relationship between price of off-street and on-street parking is not the same in different cities. Some cities apply higher on-street fees, others have higher off-street prices. Generally speaking, higher on-street parking fees – compared to off-street – might lead to lower search traffic and make garages more competitive. This is an important strategy when negotiating with private investors regarding the building of garages.

See also Argument “Reducing parking search traffic”.

Use of parking fees in Amsterdam



Source: The Amsterdam Mobility Fund, 2014

The fact is: Parking Management can raise municipal revenue that can be used to encourage sustainable mobility!

Very often cities are dependent on national governments for a large part of their budgets. In recent years cuts in these budgets have taken place almost everywhere. Property taxes are in many cities a primary source of local revenue. With the exception of very few cities, real estate values have decreased overall in Europe, reducing local revenues. Parking management or, still better, the PUSH&PULL approach can contribute to raise municipal revenue without increasing - or even reducing - the fiscal pressure on residents and at the same time improve the quality of alternatives to car use. These revenues should be (at least partly) earmarked for funding sustainable mobility measures.

In Amsterdam, for example, the gross revenue from paid parking for 2012 was ca. 160 Million Euro. Some 38% of this money was spent on the management and maintenance of the parking system, 39% went to the general city budget, and 23% was spent to fund mobility measures (31% for cycling, 18% for public transport, 13% for safety improvements etc.). This forms the Amsterdam Mobility Fund. Other cities like Gent, Barcelona, Graz or Nottingham (with the Workplace Parking Levy) are following a similar approach.

More details on the Amsterdam Mobility Fund can be read here:
http://push-pull-parking.eu/docs/file/tub_amsterdam_mobility_fund_final.pdf

Further information on the PUSH&PULL project is available at www.push-pull-parking.eu

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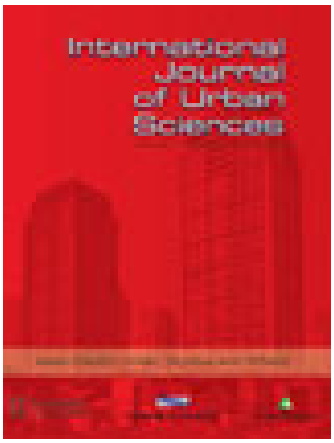

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A parking policy typology for clearer thinking on parking reform

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A parking policy typology for clearer thinking on parking reform

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This paper contends that the absence of a widely understood typology of parking policy approaches is causing confusion in an important urban policy arena. This is apparent across the parking policy literature, both academic and practical, and across several regions. Previous typologies are reviewed and found to be either incomplete, overly simplistic, inaccurate, or failing to offer insight beyond merely describing the diversity. None enables much insight into the thinking behind each approach and reform thrust. To remedy this gap, a new approach to classifying parking policies is proposed. It is based on making explicit the contrasting mindsets behind different parking reform directions. A review of geographical diversity (both international and within metropolitan areas) is presented. This allows the value of the taxonomy to be evaluated, as well as enabling some refinements. Three main mindsets are posited, with each being defined by answers to two key questions. Each mindset has contrasting assumptions about the nature of parking as an economic good. Further detail in the typology is enabled through a third dimension based on one further question. New clarity provided by the new classification approach should reduce the tendency for parking debates to be confounded by the conflation of distinct reforms, by false dichotomies and by 'straw man' portrayals of key alternatives.

Keywords: parking; parking policy; minimum parking requirements; policy problem framing; policy typologies

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1. Introduction

Parking for private motor vehicles presents stark public policy choices. Should parking supply be the responsibility of governments, motorists or real-estate developers and owners? How much parking is the right amount? To what extent should market forces shape the parking system? Policy responses to these questions make a huge difference for transport and for the urban fabric. However, there is much confusion over the policy choices available. Therefore a new typology of local government parking policy approaches is proposed here in order to clarify the nature of the fundamental choices.

1.1. *The need for a clear parking policy classification*

Unfortunately, most debate over parking proceeds without clarity on the key distinctions between policy alternatives. Protagonists in such debates often seem unaware of alternative framings of the problems and contrasting mindsets on parking itself. This state of confusion matters because parking is important in shaping both transport patterns and the built fabric.

Previous efforts to classify parking policy have been limited. Some impose false dichotomies (several different ones) that only partially or misleadingly capture variations.

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Local parking politics often involves 'straw man' caricature portrayals of alternatives. A single broad approach to parking policy, relying on minimum parking requirements, is so dominant across much of the world that it is taken as the norm. Departures from this conventional approach tend to be conflated and assumed to be essentially similar.

A North American example illustrates. Litman (2006) and Shoup (2005) both advocate significant departures from the standard practice of relying on minimum parking requirements set at cautiously high levels. So many observers tend to assume that Litman's and Shoup's 'new paradigms' are similar (Section 3). In fact, we will see that their central suggestions and key assumptions are strikingly different.

No widely used classification of parking policy approaches has so far emerged. This paper answers that need by proposing a new taxonomy of parking policy types. It emphasizes contrasting mindsets or framings, each with different assumptions about the nature of parking as a good or service. It uses two key criteria to get at the fundamental distinctions between three main mindsets, then a third dimension allows further sub-divisions within the classification. This also makes clear that there are several contrasting thrusts of parking reform.

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1.2. *The importance of mindsets and framing in parking policy*

A significant literature emphasizes the importance of policy narratives and framings for policy debates (Fischer, 2003; Stone, 1997). In urban transport policy, for example, contrasting 'story lines' of transport policy thinking have been portrayed (Low & Gleeson, 2001; Vigar, 2002).

Especially relevant here is literature on urban services and their contested portrayals as economic good types, with contrasting possible property rights regimes and regulatory approaches (for example, Webster & Lai, 2003). The intrinsic characteristics of a service rarely fully determine its framing as an economic good. The possibilities are influenced by pre-existing norms, legal constraints, ideology, business practices, and changing technology.

Furthermore, these framings and their associated policy regimes can be fluid, with changes over time and with variations from place to place, according to circumstances. Webster and Lai (2003) highlight fluidity in property regimes even for footways, parks, and local common property within neighbourhoods. We will see that parking exhibits such fluidity and is subject to a range of contrasting framings as an economic good in both theory and practice. This can be seen in the diversity of municipal policy approaches.

Debate participants employ narrative strategies that frame economic goods in their preferred ways, pointing to persuasive story lines and their favoured course of action (Stone, 1997). So mindsets can shape the terms of debate and our very thinking. But also note that mindsets are themselves influenced by discourse, by practice, and by context. We will also see that framings of parking are influenced by actual policy practice, by day-to-day pragmatic responses to conflict, and by diverse contexts and their evolution.

1.3. *Organization of the paper and its scope*

The sequence of this paper is as follows:

- Section 2 introduces the new approach to classifying parking policy.
- Section 3 examines previous efforts to classify the range of parking policy approaches, highlighting strengths, and shortcomings.

- Section 4 applies the new typology (and others for comparison) to the observable diversity of parking policy and its geographical patterns across metropolitan areas and internationally. It also argues that the new classification captures the existing diversity in parking policy more comprehensively and in a more enlightening way than previous approaches.
- Section 5 presents a more detailed version of the new typology, incorporating additional insights from Sections 3 and 4. It also seeks to demonstrate how the new typology enables clearer thinking on parking policy.

The scope here includes local government activities that plan, manage, or regulate the full range of parking facilities for private passenger motor vehicles, including on-street kerbside parking, public-sector off-street parking, and private-sector off-street parking, even though in practice these arenas often fall under multiple agencies. Parking for all private passenger purposes is included, including home-based parking and other destinations. The word 'policy' is used in a broad sense, referring to the thinking that informs local government practice, not necessarily formally adopted written statements. Geographically, attention is focused on all parts of metropolitan areas not only on city-centres.

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2. A new parking policy taxonomy based on contrasting mindsets

This section introduces a new systematic approach to classifying parking policies. Three main paradigms are identified via the answers to two carefully chosen questions. A third dimension allows sub-categories within the three main 'paradigms'. Together, these three criteria or questions reveal the various mindsets associated with the diversity of parking policy approaches.

2.1. *Three mindsets based on two criteria*

The first of the two main criteria is based on whether parking is seen as something that should be provided on every site, or as something that can serve many sites within the surrounding area (Table 1).

Interestingly, we will see in Section 3 that this was not a primary basis of any previous classification approach. The empirical basis for this choice is the geographical pattern within many Western metropolitan areas, in which suburban areas rigidly require on-site parking but many inner areas embrace public parking in park-once districts (see Section 4). This geographical pattern highlights the significance of this seemingly mundane criterion. The

Table 1. Three broad paradigms or mindsets on parking based on two criteria.

	Parking facilities serve their district	Every site should be fully served by on-site parking
Parking is a market good (real-estate based service)	'Responsive' approaches	*no cases*
Parking is 'infrastructure'	'Area Management' approaches	'Conventional site-focused' approaches

mindset in which each site must provide all of its own parking supply emerges from auto-dependent, anti-urban, 'suburban' assumptions, including: that primarily car-based access to the site is inevitable, as well as predictable; that walking between sites is unlikely; and that spillover parking would be a problem (as opposed to normal and easily managed, as in other mindsets).

The second main criterion in the new typology is whether parking is seen as something to be planned based on 'engineering' guidelines ('infrastructure' like roads) versus seeing parking as a market good, with prices, supply, and demand interacting through market mechanisms (like a real-estate based service, such as restaurants or meeting rooms).

I use the term 'infrastructure' here, despite the fact that it is a poorly defined term, to bring to mind a range of goods and services with economic characteristics (market failures) that prompt them to be provided or heavily regulated by government, so that they are non-market goods. This notion also covers accessory (or ancillary) facilities or common property services within sites, such as plumbing, fire escapes, lifts, and restrooms. In 'infrastructure' thinking, parking is an intrinsic part of the wider transport system.

This choice between 'infrastructure' and 'market good' mindsets is used as a key criterion despite the fact that market-oriented thinking on parking is a minority viewpoint (Section 3) that has a practical reality in only a narrow set of places (Section 4). Nevertheless, besides being important conceptually, this question does mark a fault-line in important parking policy debates.

The lower-right cell in Table 1 contains 'conventional site-focused' approaches, in which parking is thought of as being on-site infrastructure ideally, like restrooms which are mandated for most buildings in an almost identical way. This view sees parking as necessary for every site in order to avoid unwanted spillover of demand into nearby streets and sites. This framing as on-site infrastructure assumes that private initiative will not supply correctly, so government planning is needed. The word 'conventional' in the name reflects that this is the most widely applied and longstanding of the three paradigms.

Relaxing the insistence on on-site provision, while maintaining the view above that parking is 'infrastructure', leads to 'area management' approaches in the bottom-left cell of Table 1. As we will see in Section 4, context can influence such a shift in mindset. Insisting on on-site parking often becomes unworkable in dense, inner-city areas. Such places often begin to emphasize public parking. They must therefore also manage on-street parking more intensively. These steps are difficult to justify without a change of mindset. So 'area management' approaches see parking spaces as serving the whole area, not a specific site. In this thinking, parking is local transport infrastructure, like streets, bus stops, and walkways. It must be planned, if not necessarily provided, by government. Much western parking reform literature (especially in Europe) assumes such a mindset, although often without making these assumptions explicit (Litman, 2006; Marsden, 2006; Rye, 2010; de Wit, 2006).

Moving from the bottom-left to the top-left in Table 1 brings us to 'responsive' approaches, which see parking as a market good, rather than 'infrastructure'. Context can also influence this mindset shift. In many central business districts (CBDs) and across wide areas in Japanese cities, commercial parking with market prices is the norm (see Section 4). In such places it becomes natural to think of parking as a real-estate-based service, akin to restaurants or meeting rooms, the supply and pricing of which can largely be left to market processes. The parking reform movements inspired by Shoup (2005) can also be identified with this mindset.

What about the empty upper-right cell in Table 1? In theory, this should involve parking policy that is site-focused yet with parking as a market good. This is, in fact, conceivable

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as a description of parking practice on isolated sites. However, it cannot be the basis for comprehensive municipal parking policy.

2.2. *A third criterion completes the new parking policy taxonomy*

A third dimension is needed to capture important variations within each of the three main mindsets above. An obvious criterion, which seems able to capture observed diversity while avoiding confusion, is the attitude to parking supply. In other words, how does each parking policy type answer the question, what is the right amount of parking?

This third criterion is more obviously a continuous spectrum than the other two dimensions. Later in the paper I will further refine the set of possibilities. However, for simplicity here just three possibilities are enough: ensure parking is plentiful; match supply to demand; and limit parking supply, as shown in Figure 1.

The labels, A–I, in Figure 1 will be used in Sections 3 and 4 in order to refer to the main possibilities identified in this typology.

I will argue that the typology based on the three dimensions shown in Figure 1 can describe observed international parking policy diversity and reveal the mindsets associated with each variation. To be more precise, it captures policy diversity for places where parking has become enough of a problem to merit explicit management and policy effort. Sub-types among all of the three main paradigms are captured, including some that are usually little-noticed or which are possible but not yet observed. Importantly, this typology is also able to clarify important distinctions between sub-types that tend to be confused or conflated together.

This classification approach emphasizes mindsets that generally involve normative assertions and reflect beliefs about how parking should be arranged. Unfortunately for classification efforts, such beliefs are often unspoken except sometimes in the context of serious policy conflicts.

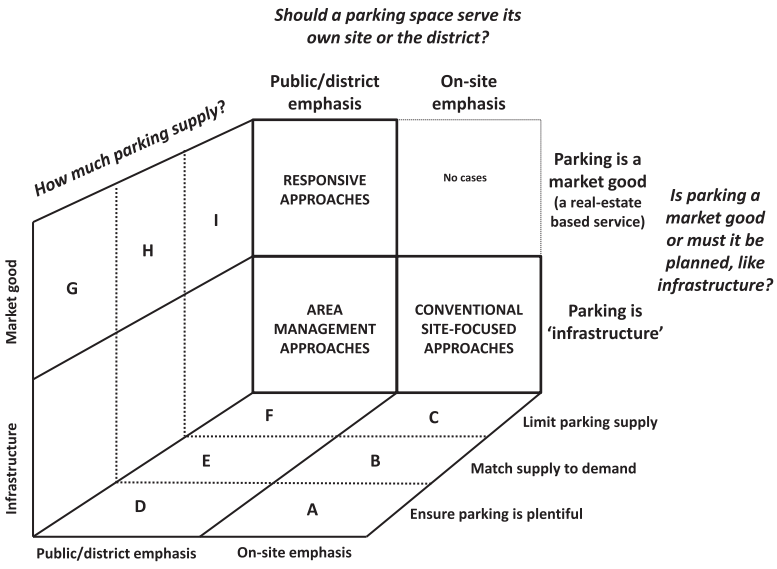

Figure 1. Simple version of the new parking policy classification approach.

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3. Parking policy classification efforts: a review

This section discusses various previous attempts to classify parking policy, both systematic and informal. It will highlight the lack of a widely used coherent framework so far. Few systematic attempts to classify parking policy approaches have been published and none seems to be well known. Nor have informal classifications filled the gap. This underscores the need for an improved approach.

Several of the classifications offer useful partial accounts of parking policy diversity. However, they seem to 'talk past each other', causing confusion. Dualistic thinking is a feature of several but with at least three distinct dichotomies or spectrums. Clearly no single-dimension approach is adequate.

3.1. *The typology that inspired the new one in this paper*

The new typology of this paper is most akin to (and was initially based on) the taxonomy of parking policy approaches that I presented in previous publications (Barter, 2010, 2011a). The Barter (2011a) version is depicted in Table 2. However, my earlier typology in Table 2 lacks sufficient clarity on its criteria.

For example, in the Barter (2011a) scheme, the 'conventional' approach was defined as having a central goal of avoiding scarcity. It would class as 'conventional' all places that aim for plentiful supply, even if they also have a focus on public parking. Further, the 'demand-realistic' sub-type of the conventional approach is defined by the goal 'avoid both scarcity and wasteful surplus'. I now see that the approach does not make clear enough the fundamental distinctions between the 'conventional' and 'parking management' categories.

The 'parking management' approach was defined in my earlier scheme as based on a central goal of planning parking to serve wider urban and transport policy objectives. However, the new typology would interpret this as merely a consequence of such a mindset, not as its defining characteristic. Similarly, the 'market-based' approach was defined in the earlier scheme based on the goal of ensuring demand, supply, and prices are responsive to each other, and with avoiding market failure. The new scheme sees this also as just an outcome, not a definition, of this mindset on parking.

Although the new typology has been inspired by my earlier one in Table 2, it adopts slightly different names for the main paradigms. 'Responsive' is used rather than 'market-oriented' because parking is almost never completely deregulated and on-street parking is inevitably in the public sector, so that market-responsiveness for on-street parking requires government initiative. 'Area management' is chosen over 'parking management' to emphasize the beyond-site, district-wide focus of this paradigm, and to avoid confusion with other

Table 2. Typology from Barter (2011a).

Approaches to parking policy		Central goals
Conventional	Autocentric	Avoid parking scarcity
	Demand-realistic	Avoid both scarcity and wasteful surplus
Parking management	Multi-objective	Plan parking to serve wider urban & transport policy goals
	Constraint-focused	Constraint of car travel (to certain locations)
Market-based		Ensure demand, supply and prices are responsive to each other. Avoid market failure.

Source: Adapted from Barter (2011a, p. 7).

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uses of the term, parking management. 'Conventional site-focused' replaces 'conventional' to more strongly emphasize that the focus of this paradigm is on-site parking.

3.2. *COST 342: from weak to strong management*

The European Union's COST 342 report, which compared parking practice across Europe and North America, provides a classification of parking policies based on predictable 'stages' in the intensity and sophistication of parking management (de Wit, 2006). The focus is parking in town centres.

Stage One involves little management in contexts with little pressure on parking. In Stage Two, as demand exceeds supply in places, on-street regulation begins by creating greater clarity on where parking is permitted. Subsequent stages involve intensifying responses to the growing pressure on the limited supply. Stage Three includes time limits, simple pricing, and municipal efforts to build off-street parking. Stage Four extends management from commercial cores to surrounding residential areas, using tools such as residential parking zones or permits. Stage Five involves increasingly sophisticated pricing differentiation. Stage Six sees out-of-town park-and-ride. Finally, Stage Seven integrates parking management into transport demand management (TDM) strategy.

This classification captures typical ways in which European inner city areas have tended to gradually intensify their parking management (for example, see Marsden, 2006; Topp, 1993). However, it ignores all parking policy for suburban contexts. It also assumes a linear progression, ignoring the possibility of divergence. For example, small USA city centres that apply a 'suburban' approach would be considered stuck at stage two or three, as would Japanese cities, rather than being seen as following distinct alternatives.

With reference to the new typology shown in Figure 1, a possible interpretation of this classification is that it fits entirely within the 'area management' approaches. Stage one is the stage before parking policy is necessary and does not appear in Figure 1. COST 342's other early stages can be seen as corresponding with a supply-focused area management approach (position D in Figure 1) in which on-street management is seen as unnecessary or too difficult, while the late stages have a demand-management focus and an embrace of intensive on-street management (position F).

3.3. *Litman's two paradigms*

Litman (2006) paints a stark contrast between an Old Parking Paradigm and a New Parking Paradigm. The former assumes 'more parking is usually better', reflects 'predict-and-provide planning', assumes demand cannot be reduced, requires plentiful on-site parking with every development, and assumes that a 'parking problem' means insufficient free parking within each site (Litman, 2006, pp. 3–4). An underlying assumption behind the Old Parking Paradigm is that 'transportation' means 'automobile travel'. This contrasts with the multimodal assumptions of his New Parking Paradigm.

Litman's New Parking Paradigm 'strives for *optimal* parking supply and price', seeks reform of excessive parking minimums, accepts sharing of parking between multiple destinations, sees opportunities to manage parking demand, and sees too much supply to be potentially as harmful as too little (Litman, 2006, pp. 4–7). It perceives various parking problems not merely shortage. His new paradigm includes reforms and practices often found in dense inner city and CBD areas, as contrasted with more auto-oriented suburban practice (see Section 4). He also calls for such efforts to be extended outwards from their inner-city heartland to a wider variety of suitable locations (Litman, 2006, pp. 23–24).

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Litman's Old Paradigm best matches position A in the new typology presented in Figure 1. However, his New Paradigm lumps together various efforts that the new typology sees as distinct approaches. Litman contrasts his old and new paradigms across several distinct policy dimensions at once but all are portrayed as varying in unison so that only two paradigms emerge. Even his Old Paradigm may also lump together approaches that the new typology of Figure 1 would see as distinct. For example, both positions A and D in Figure 1 could fall under Litman's Old Paradigm, since they emphasize plentiful parking supply.

To be fair to Litman, his main purpose was not a systematic categorization of parking policy but an appeal for readers steeped in the conventional on-site mindset to consider alternatives.

3.4. *'Engineering' thinking versus market thinking*

A market-oriented stream in the parking literature suggests a different dichotomy. It is a dimension that is missed by most classifications reviewed here. This literature tends to criticize conventional parking policy, in which supply is a planned outcome of engineering guidelines that result in parking minimums (Button, 2006). Authors in this tradition have instead suggested more market-oriented approaches to parking supply and pricing (Roth, 1965; Shoup, 2005).

Button (2006) highlights an economics literature, often focused on CBD parking markets, in which parking is treated as potentially an ordinary market good. This reflects the existence of commercial and competitive, market-priced parking industries in many CBDs, as we will see in Section 4.

Market-oriented thinkers see parking as working best when treated as a market good to be subjected to market forces. As Shoup says, 'instead of planning without prices, we can let prices do the planning' (2005, p. 602). As shown in Figure 1, such market thinking on parking necessarily involves a shift away from assuming abundant on-site parking as the norm towards parking as mostly a public neighbourhood service.

Shoup (2005) makes a much-discussed proposal for more market-responsive parking. Like Litman, he contrasts his suggestions with an old paradigm based on minimum parking requirements. But Shoup's 'new paradigm' involves a larger role for market forces than for planning. He proposes abolition of minimum parking requirements. Spillover is dealt with by pricing on-street parking in an efficient demand-responsive way to eliminate the search externality (Pierce & Shoup, 2013). Political obstacles are to be eased via 'parking benefit districts', which give local stakeholders a say on the use of the revenue. Shoup's ideas have been built on by others, including Barter (2013).

3.5. *Four approaches in Shoup's writings*

Together with his old and new paradigms, Donald Shoup also considers two other approaches to local government parking reform which he sees as second best but still worth discussing (Shoup, 2005, Chapters 9 and 10). This can be taken to suggest a four-way classification of parking policy approaches:

(1) The conventional approach based on minimum parking requirements. This is position A in Figure 1.
(2) 'Public parking in lieu of private parking', which accepts that many sites will not meet their own parking demand. Municipalities can require a fee in lieu of the required parking, while encouraging shared and public parking instead. In terms of

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the new typology in Figure 1, this is a shift from position A (or B) towards position D (or E).

(3) 'Reduce demand rather than increase supply', which encourages managing parking demand as an alternative to expanding on-site parking. In Figure 1, this would involve shifts away from position A in the direction of position C.

(4) Shoup's 'new paradigm' of responsive prices, deregulated supply and parking benefit districts. This can be taken as position H in Figure 1.

Shoup does not actually make such a classification explicit. But it would capture considerable diversity to be discussed below in Section 4.

3.6. *Willson's typology: minimums, maximums, and how they are set*

A new book by Willson (2013) includes yet another classification of local parking supply policy. It suggests five categories, based on the possibilities for the existence of minimums and the existence of maximums, then further subdividing the minimums-but-no-maximums case according to the aimed-for level of the minimums relative to expected utilization. Note that 'utilization' here seems to mean demand for parking that is free of charge.

Willson's (2013) 'traditional' approach, with minimums set higher than 'utilization' and no maximums, is clearly position A in the new typology. His 'moderate reform' approach has minimums set to match utilization and still no maximums. In terms of Figure 1, this is a shift towards position B from A. It will be discussed in Section 4 as 'right sizing' reform. His 'big city' approach has minimums and maximums set to different proportions of utilization. His 'partial deregulation' approach has no minimums but imposes maximums. In terms of Figure 1, these two approaches likely involve a shift towards position F (and possibly I in some cases) as seen in various CBDs in Section 4. Willson's 'deregulation' approach has neither minimums nor maximums. This is essentially Shoup's 'new paradigm' (position H on Figure 1).

Willson's scheme does not include the possibility of parking policy with no maximums but with minimums set *below* expected utilization. Perhaps there are no such cases in North America. However, we will see in Section 4 that Japanese cities' minimums are indeed set to such a level. We will also see a hint below in Potter's typology that this was a possibility in the UK when minimums were more prevalent there.

Willson's simple criteria capture a good range of diversity. However, when compared with the new typology, Willson's approach is less revealing of the thinking behind parking policy types.

3.7. *Potter's typology of UK approaches to parking standards*

This final classification also focuses on approaches to the setting of parking standards for private-sector non-residential parking, this time from the UK.

Presented by the KonSULT project (2006), drawing on 2001 work by H.S. Potter, it suggests the following taxonomy. The names are from the original and the descriptions are my interpretation:

- *'Demand Standards Approach'*: Parking minimums are set to at least meet all demand. This is position A in Figure 1.

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- *'Two-part and Operational Standards Approach'*: Require on-site parking for only 'operational' (or minimal) levels of demand, allowing payments in lieu of the difference. This is a variation of the payments-in-lieu reforms highlighted by Shoup above. It is also reminiscent of the missing possibility in Willson's typology, in which minimums are set below utilization. In Figure 1, this possibility falls between positions B and C within the 'area management' set of options. We will see later, through a discussion of Japan, that this option also raises the possibility of a position between H and I.
- *Capacity Rationing Approach*: Standards for a whole area set as maximums in light of the road capacity available. In the new typology this is roughly position F (or I) in Figure 1.
- *Area Needs Approach*: Weighs up multiple priorities in setting the standards, including management of public spaces, development priorities, environmental quality, traffic planning, site constraints, etc. We will see in Section 4 that parking management and supply choices often aim for a variety of goals in CBDs and some inner city areas. In terms of Figure 1, this could match positions D, E, or F depending on the supply-related priorities in each specific case.
- *Modal Split Target Approach*: Limits parking supply to modify travel behaviour in favour of non-car options. This corresponds roughly with position F (or perhaps I) in Figure 1.
- *Public Transport Accessibility Level Approach*: Set standards in inverse proportion to the ease of access public transport. This is akin to the 'right-sizing' reform mentioned in Section 4. In Figure 1, it is roughly position B.

This approach is apparently based on two main criteria for the setting of parking minimums: (a) supply-attitudes; and (b) the other objectives to be served by parking policy. This second criterion sheds light on the thinking behind each policy type but is subjective and open-ended.

3.8. *Summary comments on these previous classifications*

We have seen a surprisingly diverse range of classifications for parking policy, with widely varying bases. The first one, my earlier typology, falls short for several reasons. Several others are too simplistic because of dichotomous thinking. Most cover only part of the diversity. Most offer limited insight into the mindsets associated with parking policy types. By contrast, such insight is a key strength of the new typology. The closer attention to mindsets in the new typology will allow a clearer picture of several contrasting reform thrusts (see Section 5).

4. Observed parking policy diversity as a test of the typologies

This section provides a geography of parking policy. Each subsection begins with a portrayal of the most salient features of parking policy as found in various places. Each then explores how the classification approaches from Sections 2 and 3 would deal with each case. This provides further material for evaluating the relative merits of the typologies.

Unfortunately, literature that describes parking policies in multiple international cities is difficult to access, being highly fragmented into accounts of specific places, as well as being buried in consultants' reports, unpublished conference presentations, and local government documentation. This section draws especially on a number of broad regional or international

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overviews (particularly, Barter, 2011a; Booz Allen Hamilton, 2006; Jakle & Sculle, 2004; Ríos Flores, Vicentini, & Acevedo-Daunas, 2013; Shoup, 2005; Weinberger, Kaehny, & Rufo, 2010; de Wit, 2006). An effort has been made to capture a variety of approaches around the world, although the accessible literature is skewed geographically. Fortunately, for the purpose here, diversity is more important than comprehensiveness.

4.1. *Suburban New World parking policy*

Suburban USA parking policy provides a template for practice on parking supply all over the world, especially beyond urban core areas. This approach is based on imposing on-site parking requirements (expressed as minimums) on every real estate development. It assumes that the private sector will not supply 'enough' unless forced to. A key aim is to avoid 'spillover', defined as parking outside the destination site.

The suburban version of this is extreme in setting parking requirements at levels that eliminate almost all possibilities of on-site shortages by basing them on almost the highest conceivable parking demand situation – the yearly peak demand for free-of-charge parking at isolated sites in automobile oriented locations (Shoup 2005, pp. 75–88). Post World War II suburban areas (and some pre-war districts too) across the Anglophone 'New World' (the USA, Canada, Australia, and New Zealand) have been subject to this set of parking policies. Certain other places, such as Mexico, Brazil, Malaysia, Thailand, and Delhi in India, also have extreme parking minimums approaching suburban USA levels (Barter, 2011a, 2011b, 2011c; CSE India, 2009; Ríos Flores et al., 2013).

This approach featured clearly in most of the classification schemes above. It is position A in Figure 1, Willson's 'traditional' approach, Potter's 'demand standards' approach, and the 'old paradigm' for both Litman and Shoup. It frames parking as ideally an ancillary service in development sites with spillover seen as an externality, like pollution. This mindset seems 'natural' in the context of automobile-oriented areas where planning assumes that most people arrive by car and that almost none walk between nearby sites.

4.2. *More moderate parking minimums across the globe*

Elsewhere in the world, most parts of metropolitan areas seem subject to a less extreme version of the same approach. Most European municipalities have parking minimums outside their cores but these minimums are generally set at lower levels than in the Anglophone New World (Kodransky & Hermann, 2011).

Similar comments apply to cities across Latin America, Southeast Asia, South Asia, and much of East Asia, including even some very high-density cities such as Seoul (beyond its business districts).

Does such moderation in minimums represent reform? The answer is often no. Much of this international practice is still aimed at setting minimum requirements at cautiously high levels. Minimums end up lower than those in the USA mainly because local levels of observed parking demand are lower. They are thus often NOT the result of parking reform efforts. However, there are exceptions and these are discussed below.

4.3. *Inner city 'right-sizing' of parking requirements*

In certain places, especially those where the original urban fabric predates mass motorization or where more transit-oriented development is desired, excessive parking requirements often come to be seen as problematic. The cost of providing on-site parking is significantly higher

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with higher density development, especially on small sites, when compared with low density development on large sites (see for example, City of Portland, 2012).

The most moderate reform response to this is to 'right-size' parking minimums, making them more context-sensitive with a better match for actual demand at each location, thus trying to avoid both shortage and excess (Engel-Yan & Passmore, 2010; Forinash, Millard-Ball, Dougherty, & Tumlin, 2004; Litman, 2006, pp. 86–91). This reform is becoming common across North America, Australasia, and Europe.

In the new typology, this is a shift from position A towards position B in Figure 1, which makes it clear that this is a moderate step, with a small change of mindset in only one of the three dimensions in the scheme. Most of the other classifications also capture this approach but do not always make it obvious that this is just a small reform of the suburban version of the conventional site-focused approach. For example, Litman's dichotomy prompts him to see this modest reform as part of his new paradigm.

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4.4. *Modest inner-city flexibility in applying parking requirements*

A related set of moderate reforms is to enable some flexibility in the application of minimum parking requirements. A common example is to require fewer parking spaces in return for on-site effort on travel demand management (also called mobility management or travel plans), including offering car-sharing or parking 'cash-out' policies or 'employee mobility budgets' in place of free-of-charge employee parking (Litman, 2006, p. 41; Shoup, 2005, pp. 251–267).

Less common is allowing some or all required parking to be provided off-site but nearby. Stockholm is a European example (Kodransky & Hermann, 2011). Similarly, some cities allow shared parking agreements among nearby sites or even on-street parking to be partially counted towards required parking in certain circumstances (Litman, 2006, pp. 67–75).

The reforms mentioned so far have retained the core assumption in conventional parking policy that demand should be met in full and generally on-site. Allowing required parking to be provided off-site is a small step towards a more profoundly different approach, discussed below.

4.5. *Inner city shifts from an on-site focus to a public/district emphasis*

Parking conditions and policies for inner areas and city centres have long been distinctive relative to elsewhere in metropolitan areas. In particular, public parking often becomes more important.

Commercial public parking emerged on the periphery of American CBDs from the 1920s as car ownership first soared and kerb space became overwhelmed (Jakle & Sculle, 2004, pp. 47–55). The industry then expanded, spurred by perverse property taxes and depression-era demolitions (Jakle & Sculle, 2004, p. 61). From the 1940s, municipal parking lots and garages also emerged (Jakle & Sculle, 2004, Chapter 3). In other countries, similar trends have often been seen.

As parking minimums emerged, first in the USA, then across the globe, they were applied across whole metropolitan areas, including inner areas. However, the results for older densely developed areas were usually disappointing, and often damaging in areas where building sites are often small and built up to their boundaries. Such sites cannot easily accommodate parking, so even relatively low parking minimums can prompt demolitions and can cause missed opportunities for re-use and redevelopment. Such parking

policy based on minimums made parking a dominant land use in many urban cores across the United States by the 1970s (Jakle & Sculle, 2004; McCahill & Garrick, 2012).

From the 1970s, renewed interest in public parking emerged in many urban core areas all over the western world. This was inspired by concern over the negative impacts mentioned above, over the weak benefits of parking minimums in dense areas and by noting the efficiency of the public commercial and municipal parking that remained.

This trend was also encouraged by a new mechanism, allowing site owners the option of paying a fee 'in lieu' rather than being forced to provide the required parking on site. This helps foster public parking without the need to abolish or even to lower parking minimums (Shoup, 2005, Chapter 9). This pragmatic step has been taken by many jurisdictions in North America, Europe, and elsewhere.

Some German cities provide a hybrid example with an amusing twist. Until recently, most imposed parking minimums, as mandated by State governments. However, large cities usually allowed payments in lieu of parking. Furthermore, most then disallowed on-site provision in their urban cores. So, strangely, building owners who redeveloped a site were required to pay in lieu of required parking that they were forbidden to build (Topp, 1993).

Allowing payments in lieu of parking may seem a modest change, since it retains parking minimums. However, it decisively shifts the emphasis towards public parking. Off-site parking becomes normal and expected rather than viewed as the problem of 'spillover'. This shift in mindset occurs whether or not adequacy of supply remains a key goal, as it sometimes does. It is an inherently more 'urban' approach. It involves planning for 'park-once and walk' neighbourhoods (Tumlin, 2012, pp. 186–189).

This importance is captured in the new typology shown in Figure 1, where these reforms involve shifts from to the left from 'conventional site-focused' approaches (positions A and B) to 'area management' approaches (positions D, E and F). This insight is not so obvious in any of the other typologies.

A smaller number of places, especially city centres, went further and abolished or drastically reduced parking minimums. This step also goes with an increased emphasis on public parking. Examples include large CBDs across Australia, Canada and Europe, a few in the USA and, more recently, Seoul.

4.6. *On-street parking management*

Heavy reliance on on-site parking minimums often goes with a desire to avoid the need for on-street parking management and, sometimes, with hostility to the very existence of on-street parking (Highway Research Board, 1971, p. 2). Indeed, post-war developments in the New World often eliminated on-street parking almost completely.

Even in denser, less automobile-oriented districts, a lack of capacity or of will to manage on-street parking can encourage faith in parking minimums, despite their drawbacks for such neighbourhoods. Many newly motorizing cities in Asia and Latin America still see abundant off-street parking as the key to easing on-street problems (Barter, 2011a).

However, as mentioned above, in dense highly urban districts, site-focused parking policy tends to have disappointing results. Unless redevelopment is rapid, the expansion of required on-site parking lags behind demand so that pressure on kerbside parking remains high, as in various rapidly motorizing cities in Asia recently (Barter, 2011a).

Some North American inner cities were ruthless enough with parking minimums to avoid most on-street parking saturation. However, the cost of this was high. Some, such as Indianapolis or Atlanta, created car-friendly cores, replacing much pre-war inner-urban built fabric with new buildings with attached parking, with garages and with parking on

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vacant lots (Jakle & Sculle, 2004, pp. 153–154). Others become economically blighted, with parking minimums helping to make development or redevelopment uneconomic.

Conversely, dense urban districts that emphasize public parking and embrace 'park-once-and-walk' planning find that they must manage on-street parking intensively. This quickly became obvious in the compact inner cities of post-war western Europe, with subsequent strong efforts to reclaim public space, to favour residents, and to serve mode shift objectives (Kodransky & Hermann, 2011; de Wit, 2006). Asian cities have been slow to follow these trends but Seoul's business districts are now an exception.

On-street parking management is not explicit in the new typology in Figure 1. How do attitudes to on-street parking relate to the typology's three mindsets? All three paradigms seem to frame on-street parking as a 'common-property resource' (Shoup, 2005, pp. 590). However, the mindsets differ in their assumptions about how best to manage this commons, with contrasting implications for framing off-street parking. Conventional site-focused policy goes with a reluctance to ration on-street parking. Area management sees on-street parking as part of the district infrastructure, to be managed by government along with the off-street parking for various purposes. A preference for market-clearing prices as a rationing tool for this commons goes comfortably with seeing all local parking become part of a local real-estate service market. These are, in fact, among the classic responses to commons problems (Shoup, 2005, pp. 596–601).

4.7. *Embracing a public/district focus opens wider policy options*

An emphasis on public parking opens up the possibility of more ambitious use of parking as a policy tool. A public parking emphasis first prompts more intensive management of public parking, especially on-street parking. It then becomes easier to countenance other attitudes to supply besides simply aiming to meet demand. With this newfound freedom on supply and with growing experience with the power of parking management, various parking policy objectives become possible, as in Potter's 'Area Needs Approach' and Litman's (2006) 'new paradigm'. In the new typology of Figure 1, using parking as a policy tool is possible within much of the 'area management' paradigm, such as positions E and F (and possibly also in 'responsive' positions H and I).

In cases where a key objective of area management is traffic limitation, the new typology is more precise in placing them at position F on Figure 1. Parking minimums are often abolished (and usually replaced with maximums) Many prominent examples are in Europe, including Berlin, Amsterdam, Copenhagen's core, and London. Most large CBDs across Canada and Australia and a small number in the USA also actively restrict parking supply (Booz Allen Hamilton, 2006; Kodransky & Hermann, 2011; Weinberger et al., 2010). Few cities in Asia or Latin America have yet taken this approach, although Seoul has used parking supply limitation as a key TDM tool for its five largest business districts (Barter, 2011a; Ríos Flores et al., 2013).

4.8. *Commercial parking and market dynamics in CBDs*

Commercial parking in CBDs provide a template for those who argue that parking more generally could be more responsive to market dynamics (Barter, 2010). Such areas often have many of the called-for features, with parking minimums abolished or waived, market pricing, and competition among several operators. These are also walkable park-once environments where on-street parking is intensively regulated.

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Surprisingly, few of the previous classifications take existing market-based commercial parking in CBDs seriously as 'parking policy'. The new typology (Figure 1) includes this under the 'responsive approaches' with a market-oriented mindset on parking. Willson also highlights deregulated parking supply.

Even in real CBDs that are dominated by market-priced commercial parking, explicit parking policy rarely focuses on commercial parking or the possibility of fostering a healthy parking market. Sometimes, competition policy by higher levels of government comes into play. But most local governments focus on managing public-sector and on-street parking. In fact, where a strong area management mindset prevails, private-sector commercial parking is often seen as difficult to control and a nuisance (Marsden, 2006).

This blind spot is surprising, since commercial public parking with local competition is a worldwide phenomenon (Barter, 2011a; Jakle & Sculle, 2004). In most countries, such 'parking markets' are limited to CBDs but in certain parts of Asia, Japan especially, they are more widespread. The parking supply used in commercial parking was not necessarily the result of purely commercial decisions. It often reflects a legacy of past parking requirements, property tax incentives (sometimes accidental), zoning incentives, and subsidies of various kinds (Jakle & Sculle, 2004). With that caveat (and with only a few exceptions such as Chinese and Indonesian cities), commercial parking generally has unregulated, market prices.

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4.9. *Hong Kong and Singapore*

Hong Kong and Singapore are interesting cases, difficult to interpret in previous classification systems. Both actively constrain private vehicles and have transit-oriented development patterns. Much parking is priced and open to the public. So we might expect area management approaches and mindsets. Surprisingly then, both cities make vigorous use of parking minimums (Barter, 2011b). High-density, high-rise development patterns may be a factor (ironically). With many developments being on a huge scale, they seem to fear large mismatches in parking demand and supply. Using the terminology of the new typology, their parking policy mindsets have partially shifted from being site-focused to a public/district emphasis. In Figure 1, they might be said to be somewhere between positions B and E.

4.10. *The surprising case of Japan's cities*

Parking policy in Japanese cities presents a challenge for classification. If judged solely on obvious and explicitly stated features, their parking policies appear to be conventionally site-focused, with minimums as a central feature, applied even in city centres. There is no sign of parking being used as a TDM tool (Matsumoto, 2009). However, a closer look reveals an unusual case.

First, the parking minimums are set at very low rates throughout metropolitan areas. For example, Tokyo requires 0.3–0.4 space per 100 square metres of floor space for office and commercial buildings. They also exempt small buildings up to about 5000 square metres in floor area. Above this threshold, the minimums gradually phase in and only reach full force at 10,000 square metres of floor area (Barter, 2011c). Second, Japanese cities are unusual in having extremely limited on-street parking, with overnight on-street parking mostly banned completely since the 1950s when parking problems threatened the many extremely narrow minor streets. Third, the Japanese proof-of-parking rule is significant. This rule mandates (for all but tiny cars) that vehicle owners prove access to a near-home parking place (Barter, 2011a).

As a result of these three features, much parking in Japanese cities, even outside the central areas, is public and market priced (Barter, 2011a). Commercial parking is ubiquitous even for residential parking. There is surprisingly little bundled private parking, such as 'customer only' parking and parking for employees within business sites. However, large retailers usually offer validation, providing free parking for those making significant purchases (Matsumoto, 2009).

These policies have created a relatively responsive parking market in most urban neighbourhoods across Japan. So, in practice, mindsets on parking in Japan seem to have considerable faith in the flexibility and responsiveness of local parking systems to avoid acute shortage problems. Arguably the more pressing problem is often an overabundance of unregulated small parking operations on vacant land (Matsumoto, 2009). This reflects the innovation of coin operation, the legacy of the real-estate crash, and of tax and planning incentives that perversely encourage this land-use.

These responsive parking arrangements seem to be an accidental outcome, not mentioned as a goal in formal policy documents (Barter, 2011a). Until recently, such documents were preoccupied with an alleged parking shortage in inner areas and many local governments did seek to construct parking (with limited results). Such municipal parking is now generally market priced.

If explicitly stated policy is used, Japanese cities would seem to fall somewhere near position B in Figure 1 of the new typology. But in actual practice, Japanese parking is probably better seen as fitting a 'responsive approach', near position H. Of the other classification schemes, only Potter's 'two part and operational standards' approach comes close to identifying the Japanese situation.

5. The new typology enriched

This section begins by highlighting how the new typology should enable clearer thinking on three distinct reform thrusts that are often confused, conflated, or ignored in parking debate. It then presents a more detailed diagram for the new typology, based on insights derived from Sections 3 and 4. Finally, it discusses further ways in which the new classification approach provides useful clarity.

5.1. *Three reform thrusts made obvious*

The new classification approach for parking policies provides useful insight into the nature of parking reform directions. The new typology highlights at least three distinct dimensions of reform away from conventional practice, as depicted by the arrows in Figure 2.

Right-sizing reforms are represented by shifts backwards on the diagram from position A towards position B. Such reforms usually remain within the site-focused paradigm, changing only the attitude to supply. Note that similar shifts along the attitudes-to-supply dimension would also be possible within an area management paradigm or even within the responsive paradigm.

Reforms urged by authors such as Litman (2006), Tumlin (2012) or Rye (2010) also require some right-sizing or limitation of supply (a shift backwards along the attitudes-to-supply dimension). But, more importantly, they involve a shift to the left from site-focused approaches into the area management approaches.

Donald Shoup's suggestions (and others akin to them) can now be seen as a third, highly distinct, agenda corresponding to the upward arrow in Figure 2, which points away from the parking-as-infrastructure row into the parking-as-market good row. If such reform begins

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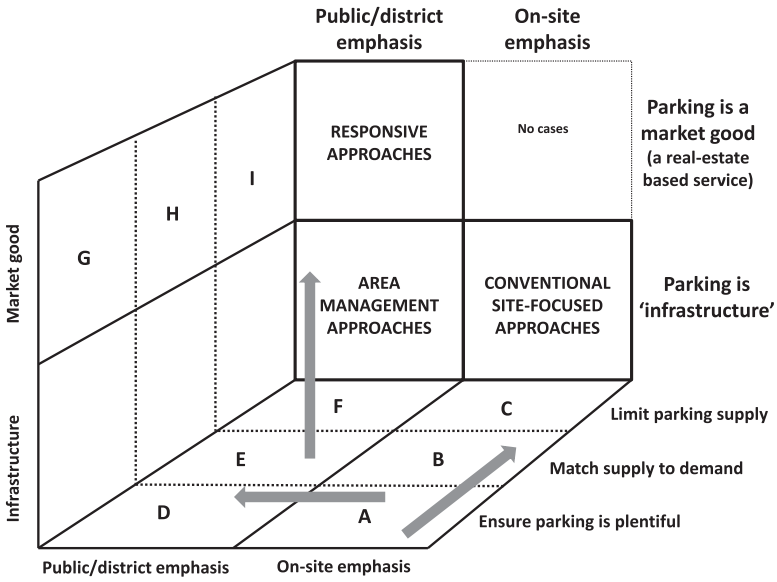

Figure 2. The new typology with three major reform thrusts highlighted.

with the extreme suburban conventional on-site approach (position A), then we can see that a shift towards position H is more radical than those mentioned above. It requires simultaneous or sequential changes on the adequacy of supply, on the site-focus versus district-emphasis, AND on the infrastructure versus market-good dimensions.

5.2. *The new typology in more detail*

Insights from Sections 3 and 4 now allow a more detailed elaboration of the new typology diagram. This is depicted in Figure 3.

The typologies and policy diversity in previous sections have suggested a need for more than three possibilities along the attitudes-to-supply spectrum. The extreme cases remain the same but 'match supply to demand' can now be divided into several variations. 'Right-sizing' reforms are now shown with two possible supply attitudes, one that seeks supply levels consistent with free-of-charge pricing, and another in which supply matches demand at some 'traditional' price above zero. In addition, the idea behind the 'two-part and operational' and Japanese cases is accommodated with the label 'ensure only "essential" demand is met'. Further, a cost-sensitive approach to parking supply is added, which in practice would result in constrained supply (relative to most status quo approaches) even if restricting supply is not an explicit goal.

The two primary criteria from Figures 1 and 2 are also potentially spectra (although in a more limited way than for the attitudes-to-supply dimension). Therefore Figure 3 shows intermediate and extreme possibilities on these dimensions, rather than just the two seen in Figures 1 and 2. For example, an on-site emphasis can be rigid and extreme or more relaxed with room for exceptions and for some public parking. A shift to a public/district emphasis can be moderate or thorough. In the latter, on the left edge of that column, the very idea of spillover is rendered meaningless because, when parking is usually public, then off-site parking becomes the norm and is not some externality to be feared. Finally, both moderate and more radical attitudes to market forces are possible.

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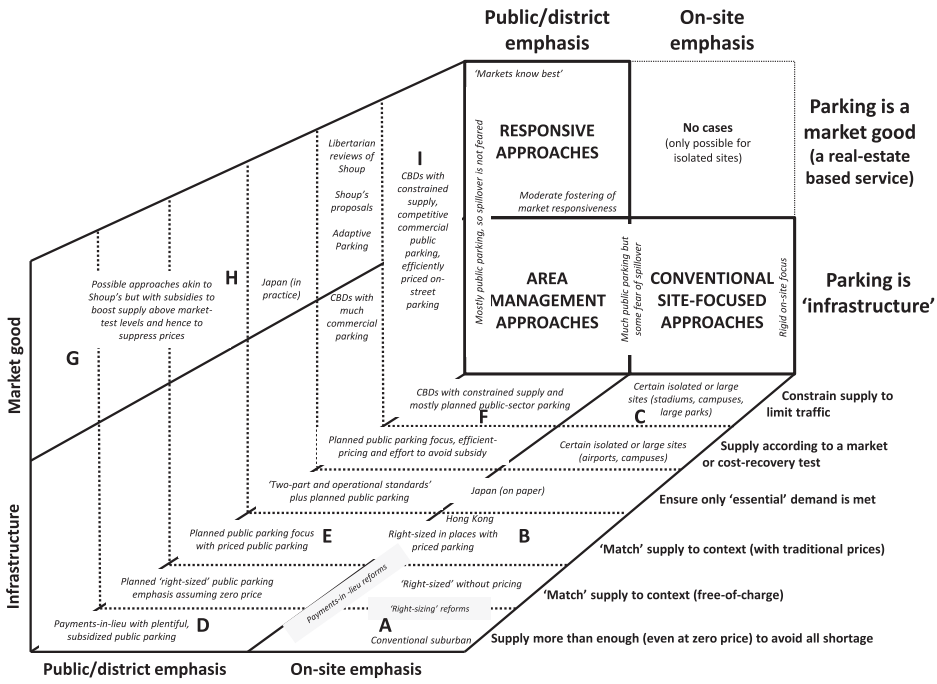

Figure 3. The new typology of parking policy approaches in more detail.

5.3. *New clarity on parking policy options and trajectories*

We have seen that the new approach to classifying parking policy helpfully highlights three important and distinct reform dimensions. A related contribution is clarity on the differences between 'area management' approaches (such as most of Litman's suggestions) and 'responsive' approaches (which include Shoup's suggestions).

Awareness of mindset differences between these approaches makes their policy differences less puzzling. For example, responsive parking enthusiasts are often sceptical of park-and-ride proposals, an area management favourite. While both paradigms would usually support higher prices on-street than off, a responsive approach would prefer to achieve this via demand-responsive price setting not administrative planning. Area management thinking often prompts suspicion of private sector commercial parking, which is more welcomed in responsive approaches.

The new typology provides improved clarity about not just the differences but also the conceptual boundary between the conventional site-focused and area management approaches. Position D in Figure 3 would be considered 'conventional' in my 2010/2011 typology or as part of the 'old paradigm' in Litman's dichotomy. In this paper's new typology it is within the area-management paradigm, despite its appetite for plentiful supply. This is a useful clarification, suggesting that relatively politically feasible reforms towards position D (from a starting point at A) might be a helpful stepping stone towards more ambitious reforms towards E or H or beyond.

Indeed, the new typology and Figure 3 provide useful perspectives on trajectories of parking reform more generally. Most accounts of change in Sections 3 and 4 (including 'right-sizing', adoption of in-lieu payments, and the imposition of parking maximums in CBDs) can be understood as shifts over a short 'distance' on the diagram. This can also be seen in the tendency for trials of Shoup's ideas so far to be in places, such as inner San

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Francisco, where the mindset is already near position E (with area-management thinking and a moderate view of supply). This resonates with Willson's (2013) argument that only incremental parking reform may be realistic.

Note that contrasting approaches and mindsets can occur in close proximity and within a single municipality. Numerous inner-urban main streets have a public/district emphasis, even as the residential areas on either side remain subject to conventional site-focused policy. Stakeholders are apparently able to think about parking in neighbouring locations in quite distinct ways. Of course, parking problems at such boundaries often prompt policy debate in which alternative mindsets play a role.

The new typology also highlights policy possibilities that have been little noted in the past. These include:

- Responsive possibilities that are nevertheless supply-focused (position G or nearby) in which any boosting of supply would need to be by market-friendly tools, such as subsidies, rather than parking minimum regulations;
- More extreme market-based 'responsive' options above positions H and I on the diagram. For example, certain reviewers of Shoup, such as Klein (2006), argue for more thorough deregulation, privatization, and 'free market' parking;
- Hybrids of responsive and area management approaches (between positions H and E, for example), with area management thinking and goals combined with a preference for market-oriented tools;
- Position C provides insights into large campuses, airports and hospitals. These do not challenge the site-focused perspective even though many of them price parking and some even restrict its supply. The typology highlights their site-focus, although autonomy or isolation (and hence a lack of spillover concern) allows them to exercise parking management choices that often mirror those of CBDs.

6. Conclusion: towards new clarity in parking policy debates

Parking reform is an important issue and clearer thinking should assist policy making. Confusion is currently hindering efforts to debate important reforms.

So it is important that the new typology presented here captures observed diversity well and brings to the fore people's assumptions about parking. It makes important distinctions, avoiding confusing conflation of different reform agendas. It also reveals commonalities among approaches that are sometimes assumed to have no kinship. It provides insights into how incremental or how radical various reform steps are.

There is also value in focusing attention on framings or mindsets in parking policy. The resilience of the conventional site-focused approaches, despite robust attacks, can be seen as emerging in part from a powerful framing that matches suburban dwellers and local planners experience (Ferguson, 2004). Its grip also reflects a relative absence from debates of powerful framings for the main parking policy alternatives.

Thus, even though this paper has not taken a stance on the merits of reform, it may improve the prospects for reform if the new parking policy typology presented here can aid understanding, reduce confusion, and uncertainty, and provide more powerful framings for parking reform efforts.

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5.4 Parking Costs

This chapter explores the costs of providing parking. It investigates the costs of different types of parking facilities, the number of spaces per vehicle, and the distribution of parking costs.

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5.4.2 Definitions

Parking costs include parking facility land, construction and operating costs, plus indirect costs such as stormwater management costs. There are various types of parking facilities:

- *On-street parking* consists of parking lanes provided within public road rights-of-way.
- *Off-street parking* are parking facilities on their own land, not on road rights-of-way.
- *Surface parking* refers to parking lots directly on land.
- *Structured parking* (also called *parkades* or *ramps*) are parking facilities in or under multi-story buildings.

5.4.3 Discussion

Land Area and Value

A typical parking space is 8-10 feet (2.4-3.0 meters) wide and 18-20 feet (5.5-6.0 meter) deep, totaling 144-200 square feet (13-19 sq. meters).[1] Off-street parking typically requires 300-350 square feet per space, including access lanes and landscaping, allowing 100-150 spaces per acre (250-370 per hectare), depending on design. Land costs can vary from thousands of dollars per acre in rural areas to millions of dollars per acre in central business districts (CBDs). Because parking must be located near destinations, it often requires relatively high-value land. Parking facility land is sometimes considered to have little or no value. For example, building or campus managers sometimes consider land as free, and so only consider operating and maintenance expenses when calculating parking costs. But there is usually an opportunity cost to devoting land to parking, since it could be used for buildings, landscaping, leased or sold. Similarly, parking lanes can be converted to traffic lanes, busways, bike lanes, landscaping, or additional sidewalk space. Some cities even convert parking spaces to "parklets" (small sidewalk parks).[2]

Construction Costs

Parking facility construction costs are affected by size per space, size and shape of site (small and irregular shaped sites increase unit costs), number of levels (more levels increase unit costs), topography (slopes and poor soil conditions increase costs), design (exterior aesthetic treatments can increase costs), and geographic location. Structured parking involves a trade-off between construction and land costs. Structured parking typically becomes cost effective when land prices exceed about $1 million per acre.

Table 5.4.3-1 **Parking Structure Construction Costs**[3]

City	Cost Per Space	City	Cost Per Space
Atlanta	$14,028	Los Angeles	$16,842
Baltimore	$14,479	Miami	$14,043
Boston	$17,947	Minneapolis	$17,079
Charlotte	$12,441	New Orleans	$13,825
Chicago	$17,869	New York	$20,326
Cleveland	$15,474	Philadelphia	$17,604
Denver	$14,774	St Louis	$15,178
Dallas	$13,281	San Francisco	$19,253
Detroit	$16,049	Seattle	$16,158
Kansas City	$15,878	*National Average*	*$15,552*

[1] James Hunnicutt (1982), "Parking, Loading, and Terminal Facilities," in *Transportation and Traffic Engineering Handbook*, Institute of Transportation Engineering/Prentice Hall, 1982, p. 651.
[2] *Pavement to Parks* (http://sfpavementtoparks.sfplanning.org) San Francico Parks Department.
[3] Carl Walker (2009), "Parking Structure Cost Outlook for 2009," *Industry Insightes*, Carl Walker, First Qr.; at www.carlwalker.com/press/newsletters.

Overall, U.S. parking structure construction costs are reported to average about $15,000 per space or $44 per square foot in 2008, however this may include ground floor spaces which should not be counted.[4] In addition to these "hard" costs, facility development usually involves "soft" costs for project planning, design, permits and financing, which typically increase project costs by 30-40% for a stand-alone project. Shoup documents construction costs ranging from $13,712 to $31, 500 per space at a California university between 1990 and 2002.[5] He notes that most spaces in parking structures cost more than the cars that occupy them. Future construction costs may increase above the rate of inflation due to increased petroleum costs and carbon taxes or cap-and-trade costs on emissions from concrete and steel manufacturing.

Operation and Maintenance

Operation and maintenance costs include cleaning, lighting, maintenance, repairs, security, landscaping, snow removal, access control (e.g., entrance gates), fee collection (for priced parking), enforcement, insurance, labor and administration. Parking facilities require resurfacing and repaving every 5-10 years, and parking structures require major reconstruction or replacement after 20-40 years, with higher maintenance costs in areas with harsh climates, particularly with frequent salt exposure. Parking structures may require elevators, fire control and mechanical ventilation. Private parking facilities must pay taxes and provide profits. The incremental cost of fee collection ranges from less than $50 annually per vehicle for a simple pass system with minimal enforcement, to more than $500 per space for facilities with attendants or automated control systems. A 1998 study found that typical annual costs per space ranged from about $200 for basic maintenance of a surface lot, up to $800 for a facility with tollbooth attendants.[6]

A 1996 survey found that commercial parking operating expenses average about $500 annually per space, about half of which is associated with fee collection and security:[7]

Cashiering Salaries & Benefits	$120
Management and supplies	85
Security	67
Utilities	58
Insurance	16
Routine Maintenance	19
Structural Maintenance	50
Snow removal	4
Equipment maintenance	11
Other expenses	64
Total	*$494*

[4] Joey D. Rowland (2008), "Contruction Cost Outlook for 2008," *Industry Insights*, Carl Walker Parking (www.carlwalker.com); at www.carlwalker.com/sites/default/files/pdfnews/1st_quarter_4up_final_ag.pdf.
[5] Donald Shoup (2005), *The High Cost of Free Parking*, Planners Press (www.planning.org). Table 7-3 p 211. Values not adjusted for inflation.
[6] John Dorsett (1998), "The Price Tag of Parking," *Urban Land*, Urban Land Institute (www.uli.org), May 1998, pp. 66-70.
[7] ITE (1999), *Transportation Planning Handbook*, ITE (www.ite.org) p. 535.

Table 5.4.3-2 shows operating costs at several commercial parking facilities from a 2005 survey, indicating that costs typically range from $500 to $800 per space per year, including employee wages and benefits, facility maintenance and cleaning, utilities, taxes, and insurance.

Table 5.4.3-2 **Sample Commercial Parking Facility Annual Operating Expenses**[8]

	Fort Collins, CO	Phoenix, AZ	Boise, ID	Portland, OR
Number of parking spaces	903	744	495	413
Total operating costs	$416,400	$519,100	$361,800	$349,400
Cost per space	$461	$698	$731	$846

Marginal Costs

Parking facility costs are often perceived as sunk. Land devoted to parking is often treated as having no opportunity costs, so the only costs of increasing supply are construction and maintenance expenses. Once a parking space is built or leased, facility owners and managers often assume there are minimal savings if parking demand were reduced, for example, if employees shift modes and leaving parking spaces unoccupied. However, reducing parking demand usually can provide savings and benefits, by avoiding the need to add parking to accommodate growth, by allowing parking facilities to be leased or rented for other users, or the land can be converted to other uses such as buildings or greenspace, or sold. Opportunity costs are particularly large in growing urban areas where parking demand and land prices are high and increasing, and in areas with high environmental values where reducing pavement provides substantial benefits.

Environmental and Indirect Costs

Paving land for parking imposes environmental costs, including greenspace loss (reduced landscaping, farmland, wildlife habitat etc.), increased impervious surfaces, and related stormwater management costs, heat island effects and aesthetic degradation.[9] Generous parking requirements and low parking prices tend to discourage infill development, encourage sprawl (low density, dispersed development patterns).[10] As a result, it tends to increase per capita vehicle ownership and use and reduces the viability of other modes such as walking, cycling and public transit. Generous residential parking requirements also tend to reduce housing affordability.[11]

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[8] PT (2005) "What's It Cost You To Run Your Garage?," *Parking Today* (www.parkingtoday.com), May, pp. 30-32.
[9] Todd Litman (2002), *Evaluating Transportation Land Use Impacts*, VTPI (www.vtpi.org); at www.vtpi.org/landuse.pdf.
[10] Richard Willson (1995), "Suburban Parking Requirements; A Tacit Policy for Automobile Use and Sprawl," *Journal of the American Planning Association*, Vol. 61, No. 1, Winter 1995, pp. 29-42.
[11] Todd Litman (2008), *Parking Requirements on Housing Affordability*, VTPI (www.vtpi.org); at www.vtpi.org/park-hou.pdf.

The construction of parking facilities, particularly parking structures, consumes large quantities of energy and results in significant emissions of greenhouse gases from the production of concrete and steel. Ongoing operations and maintenance also requires energy and materials that have environmental costs. Shoup cites a UCLA (Los Angeles, California) Environmental Impact Report data to estimate external congestion costs of $73 per month per space and pollution costs of $44 for a total external cost of $117 per month per space assuming 83 one-way trips per space totaling 727 vehicle miles.[12] This estimate does not include the additional greenhouse gas emission costs from increased vehicle travel and parking structure construction.

Parking Versus Mobility and Accessibility

There are often conflicts between the use of curb lanes for parking or for *mobility*, including general lanes, special lanes for buses, high-occupancy-vehicles or bicycle, or for wider sidewalks. In some situations, converting parking lanes to other uses can be justified if it will result in a shift from driving to alternative modes, reducing parking demand in an area. For example, about 30,000 people commute to downtown Victoria each day, about 20,000 by automobile and 3,000 by bicycle. If converting one-mile of on-street parking to bicycle lanes reduces parking supply by 100 spaces, but by improving cycling conditions would shift an additional 1% of automobile commuters (i.e., 200 commuters) to cycling, the result would be a net increase of 100 spaces in downtown parking supply. Similarly, shifting parking to busways or HOV lanes can make these modes more attractive, reducing automobile trips to downtown that may partly or completely offset the loss of parking spaces downtown.

Parking planning can also face conflicts between *mobility* (i.e., physical movement) and *land use accessibility* (common destinations located close together). Generous parking requirements tends to create automobile-oriented transportation systems and land use patterns, with dispersed destinations that require more mobility, while parking management tends to support more clustered land use patterns where less mobility is needed. For example, with commercial strip development, businesses are scattered along a highway, each with its own abundant supply of parking. To run a dozen errands it is necessary to take a dozen individual automobile trips from one business to another. A downtown or other urban center, has narrower streets and less parking supply, which reduces mobility, but it tends to have better accessibility because more destinations are located within convenient walking distance. To run a dozen errands generally takes only one or two car trips, with most destinations accessible by walking.

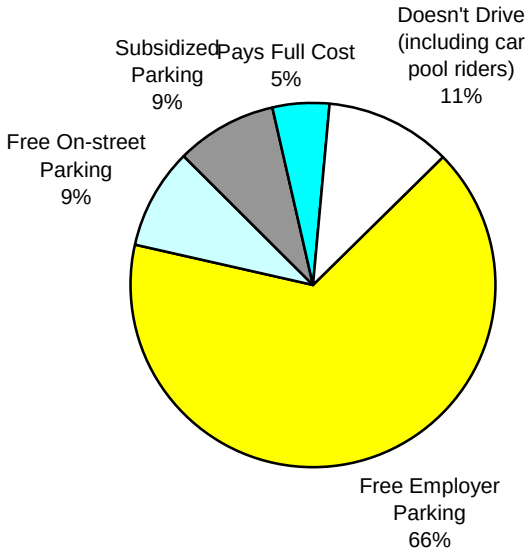
Similarly, the area around a transit station can be developed as a park-and-ride center or as an urban village, with businesses and higher-density residential development clustered around the station (called *Transit Oriented Development*). Park-and-ride facilities tend to increase mobility, allowing suburban commuters to use public transit, while urban villages increase accessibility, and therefore help reduce total per capita vehicle travel. Effective parking management can help balance these conflicting objectives, allowing a certain amount of park-and-ride activity without spoiling the ability of a transit station to be a catalyst for an accessible urban village.

[12] Donald Shoup (2005), *The High Cost of Free Parking*, Planners Press (www.planning.org). p. 197.

Parking Cost Distribution

Motorists use unpriced parking for most trips; of the 95% of US commuters who drive, only about 5% pay full parking costs and 9% pay a subsidized rate, while unpriced parking is provided for more than 99% of non-commute trips.[13] Overall, probably about 5% of non-residential parking costs are paid directly by users. The costs of unpriced parking are borne by businesses and governments, and ultimately by customers and taxpayers. Most employee parking is income tax exempt, a benefit to automobile commuters worth up to $1,800 per year. The foregone taxes can also be considered a parking subsidy.

Figure 5.4.3-1 **Employee Parking Subsidy Patterns**[14]



Most commuters who drive use unpriced parking.

There is some debate among economists as to whether unpriced parking should be considered a *subsidy*, since most of these costs are ultimately borne by motorists through housing costs, taxes, retail purchases and as a portion of employment benefits.[15] Some prefer to call it a *bundled good*, that is, something included with a purchase. But regardless of whether they are called a *subsidy* or a *bundled good*, unpriced parking is a market distortion that violates the basic principles of economic efficiency: that consumers should have viable options to choose from, and that prices should reflect marginal costs.

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[13] USDOT(1992), 1990 NPTS, *Summary of Travel Trends*, (www.dot.gov).
[14] Miller and Moffet (1993), *The Price of Mobility*, National Resource Defense Council (www.nrdc.org).
[15] José Gomez-Ibañez (1997), "Estimating Whether Transport Users Pay their Way," *The Full Costs and Benefits of Transportation*, Springer (Berlin), pp. 149-172.

Amount of Land Devoted to Parking Facilities[16]

Table 5.4.3-3 shows estimated U.S. off-street U.S. parking spaces for commercial buildings. This may overestimate actual commercial parking spaces, since some buildings have fewer than currently recommended supply, because they are older or are located in Central Business Districts (CBDs), but this is offset by the fact that some types of facilities with off-street parking, such as public parks, are not included.

Table 5.4.3-3 **Estimated U.S. Commercial Parking Spaces, 2003**[17]

Building Type	Total Floor Area	Parking Spaces	Parking Spaces
	Million Sq. Feet	Spaces/1,000 Sq. Ft	Thousands
Education	9,874	3	29,622
Food Sales	1,255	3	3,765
Food Service	1,654	4	6,616
Health Care	3,163	3	9,489
Lodging	5,096	3	15,288
Mercantile	11,192	4	44,768
Office	12,208	4	48,832
Public Assembly	3,939	4	15,756
Pubic Order and Safety	1,090	3	3,270
Religious Worship	3,754	3	11,262
Service	4,050	3	12,150
Warehouse and Storage	10,078	1	10,078
Other	1,738	2	3,476
Vacant	2,567	2	5,134
Total	*71,658*		*219,506*

Chester, Horvath and Madanat estimate there are between 105 million and 2.0 billion on- and off-street parking spaces in the U.S., based on the five scenarios summarized below, which indicates between 0.5 to 8 parking spaces per vehicle.

Table 5.4.3-4 **Estimated U.S. Parking Spaces**[18]

Type	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
On-street	35	92	180	150	1,100
Surface	36	520	520	610	790
Structure	34	110	110	84	120
Total	*105*	*730*	*820*	*840*	*2,000*

This table summarizes various estimates of U.S. parking spaces.

[16] Todd Litman (2000), *Transportation Land Valuation*, VTPI (www.vtpi.org).

[17] EIC (2003), *2003 Commercial Buildings Energy Consumption Survey—Overview of Commercial Buildings Characteristics*, Energy Information Administration, U.S. Department of Energy (www.eia.doe.gov); at www.eia.doe.gov/emeu/cbecs/cbecs2003/introduction.html

[18] Mikhail Chester, Arpad Horvath and Samer Madanat (2010), "Parking Infrastructure: Energy, Emissions, And Automobile Life-Cycle Environmental Accounting," *Environmental Research Letters*, Vol. 5, No. 3; at http://dx.doi.org/10.1088/1748-9326/5/3/034001; project of the UC Berkeley Center for Future Urban Transport (www.sustainable-transportation.com).

Delucchi estimated 125 to 200 million non-residential, off-street parking spaces in the US in 1991, 0.5 to 0.8 spaces per capita, or 0.7 to 1.1 spaces per vehicle, as summarized below, but this estimate excluded some land use categories that generally include parking such as religious institutions, vehicle dealers, stadiums and parks. Pijanowski found approximately three non-residential off-street parking spaces per vehicle in Tippecanoe County, a typical rural county.[19] Shoup calculates that, including on-street parking, US cities have an average of about of eight parking spaces for each car. [20]

Table 5.4.3-5 **Calculation of Land Area Devoted to Parking**[21]

Nonresidential Offstreet Parking	Low	High
Offstreet nonresidential parking spaces (millions)	125	200
Fraction in lots as opposed to garages	0.65	0.65
Size of parking space (ft2)	150	150
Total ground footprint of parking lot/total parking area	2.17	2.17
Total ground footprint of garage/total parking area	0.20	0.33
Residential offstreet parking		
Housing units with a garage or carport (million HUs)	58.2	58.2
Average area to cars, per garage or carport (ft2)	167	225
Average area per residential driveway (ft2)	190	238
HUs with offstreet residential parking other than own garage or carport (million HUs)	36.0	36.0
Parking spaces per HU with offstreet parking in lot, carport, or driveway	1.09	1.19
Parking spaces per HU with other offstreet residential parking in garage	1.02	1.10
Fraction of other spaces in lots as opposed to garages	0.87	0.87
Total ground footprint of parking lot/total parking area	2.17	2.17
Total ground footprint of garage/ total parking area	0.27	0.72
Calculated total land area devoted to parking cars (square miles)	*2,146*	*3,064*

Davis, et al. (2010) used detailed aerial photographs to estimate the number of parking spaces in surface lots in Illinois, Indiana, Michigan, and Wisconsin.[22] Parking lots were identified as paved surfaces with stripes painted on the surface or where more than three cars were parked in an organized fashion, which excluded on-street and structured parking spaces (other than the top floor if the structure has an open roof), and residential parking spaces not in parking lots. They identified more than 43 million parking spaces in these four states, which averages 2.5 to 3.0 off-street, non-residential spaces per vehicle. They estimate that these four states allocate 1,260 km^2 (976 km^2 lower bound to 1,745 km^2 upper bound) of land to parking lots. This accounts for approximately 4.97% of urban land, with a higher proportion where urban sprawl is most prevalent.

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[19] Bryan Pijanowski (2007), *Parking Spaces Outnumber Drivers 3-to-1, Drive Pollution and Warming*, Purdue University (www.purdue.edu); at www.purdue.edu/uns/x/2007b/070911PijanowskiParking.html.
[20] Donald Shoup (2005), *The High Cost of Free Parking.* Planners Press (www.planning.org).
[21] Mark Delucchi (1997), *Annualized Social Cost of Motor-Vehicle Use in the U.S., 1990-1991*, Vol. 6, Institute of Transport Studies (http://engineering.ucdavis.edu/), Table 6-A.1.
[22] Amélie Y. Davis, Bryan C. Pijanowski, Kimberly D. Robinson and Paul B. Kidwell (2010), "Estimating Parking Lot Footprints In The Upper Great Lakes Region Of The USA" *Landscape and Urban Planning*, Vol. 96, Issue 2, 30 May 2010, Pages 68-77; at www.citeulike.org/article/6869205.

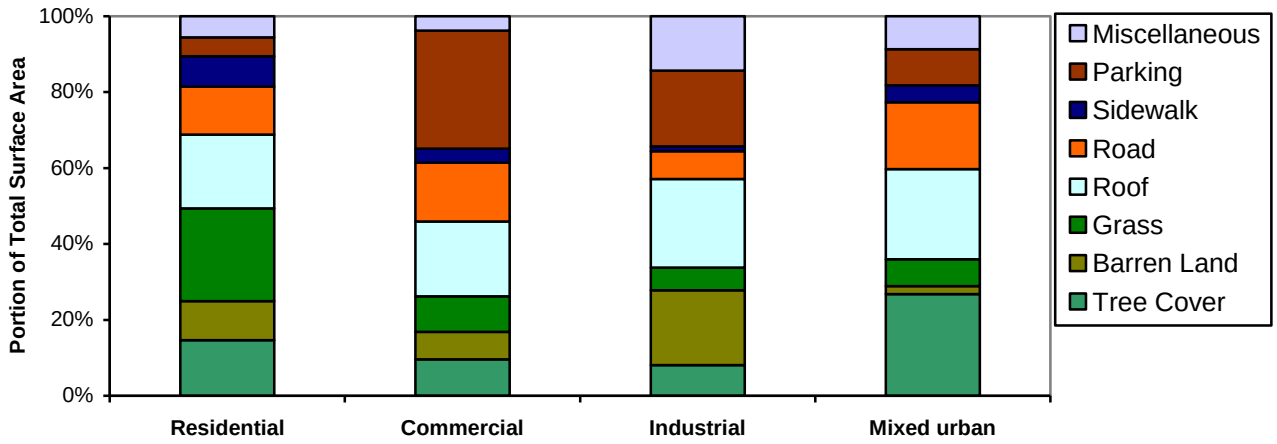
Table 5.4.3-6 **Calculated Surface-Area Percentages**[23]

	Tree Cover	Barren Land	Grass	Roof	Road	Sidewalk	Parking	Miscellaneous
Residential	14.7	10.2	24.5	19.4	12.7	8.0	4.9	5.6
Commercial/service	9.6	7.3	9.3	19.8	15.5	3.7	31.1	3.8
Industrial	8.1	19.7	6.0	23.4	7.3	1.3	20.0	14.3
Transport/communications	0.0	4.0	0.0	5.0	80.0	1.0	10.0	0.0
Industrial and commercial	2.8	15.6	5.6	19.2	10.3	1.3	32.1	13.1
Mixed urban	26.8	2.1	7.1	23.7	17.6	4.5	9.5	8.7

This table summarizes the surface area of various types of land uses in Sacramento, California.

Overall, pavement covers about 35% of the surface area of most residential areas and 50–70% in most non-residential areas and summarized in Table 5.4.3-6 and Figure 5.4.3-2.

Figure 5.4.3-2 **Calculated Surface-Area Percentages**[24]



This figure illustrates the surface area of various types of land uses in Sacramento, California.

This suggests that there are probably at least three off-street parking spaces per vehicle (one residential and two non-residential), plus two urban on-street spaces, although the estimated number of on-street spaces is arbitrary since most suburban and rural roads have shoulders suitable for parking but are not located near destinations. The number of parking spaces per vehicle tends to be lower in urban areas where parking is shared and higher in suburban and rural areas where each destination supplies all its own parking. Multi-story parking structures require less land per space, and underground parking can be considered to use no additional land.

[23] Hashem Akbari, L. Shea Rose and Haider Taha (2003), "Analyzing The Land Cover Of An Urban Environment Using High-Resolution Orthophotos," *Landscape and Urban Planning* (www.sciencedirect.com/science/journal/01692046), Vol. 63, Issue 1, pp. 1–14.
[24] Akbari, Rose and Taha (2003)

Total Parking Costs

The table below illustrates typical parking facility financial costs per space, which vary from about $670 annually for surface parking where land is considered free, to $4,000 in central business districts. These do not include indirect and environmental costs.

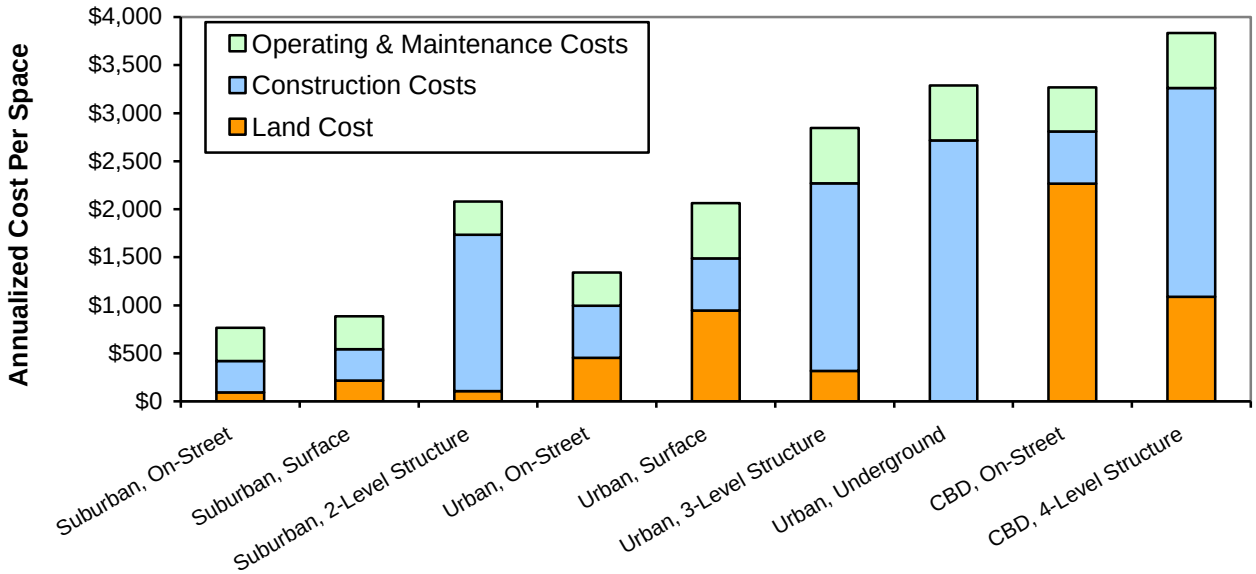
Table 5.4.3-7 **Typical Parking Facility Financial Costs (Parking Spreadsheet)**

Type of Facility	Land Cost Per Acre	Annualized Land Cost Per Space	Annualized Construction Costs	Annual O & M Costs	Total Annual Cost	Total Monthly Cost
Suburban, On-Street	$250,000	$94	$326	$345	$765	$64
Suburban, Surface, Free Land	$0	$0	$326	$345	$671	$56
Suburban, Surface	$250,000	$215	$326	$345	$885	$74
Urban, On-Street	$1,200,000	$453	$543	$345	$1,341	$112
Urban, Surface	$1,200,000	$944	$543	$575	$2,062	$172
Urban, 3-Level Structure	$1,200,000	$315	$1,954	$575	$2,844	$237
Urban, Underground	$1,200,000	$0	$2,714	$575	$3,289	$274
CBD, On-Street	$6,000,000	$2,265	$543	$460	$3,268	$272
CBD, 4-Level Structure	$6,000,000	$1,089	$2,171	$575	$3,835	$320
CBD, Underground	$6,000,000	$0	$3,776	$575	$4,007	$334

This illustrates typical parking facility costs. The "Parking Cost, Pricing and Revenue Calculator" (www.vtpi.org/parking.xls) calculates these costs based on specific input values.

Figure 5.4.3-3 illustrates these annualized costs.

Figure 5.4.3-3 **Typical Parking Annualized Costs per Space (2007 USD)**[25]



This figure illustrates estimated annualized costs per parking space. As noted above, values can vary significantly depending on factors such as local land values.

[25] VTPI (2008), *Parking Cost, Pricing and Revenue Calculator*, Victoria Transport Policy Institute (www.vtpi.org); at www.vtpi.org/parking.xls.

Assuming two on-street and three off-street parking spaces (one residential and two commercial) per vehicle in a typical urban area, with annualized costs averaging $600 per on-street, $800 per residential off-street, and $1,200 per non-residential off-street space, this totals $4,400 per vehicle. Costs per space are lower in suburban and rural areas due to lower land costs, but there tend to be more spaces per vehicle in such areas so parking cost per vehicle are probably similar. As mentioned previously, only about 5% of total non-residential parking costs are paid directly by users. Table 5.4.3-8 summarizes estimated parking costs, indicating that about three-quarters of total parking costs are borne indirectly, and can be considered external, since they are borne by non-users.

Table 5.4.3-8 **Estimated Annualized Parking Costs Per Vehicle**

	Spaces Per Vehicle	Annual Cost *Per Space*	Paid Directly By Users	Directly-Paid Costs	External Costs	Total Costs
Residential	1	$800	100%	$800	0	$800
Non-res. Off-street	2	$1,200	5%	$120	$2280	$2,400
On-street	2	$600	5%	$60	$1140	$1,200
Totals	*5*			*$980 (22%)*	*$3420 (78%)*	*$4,400 (100%)*

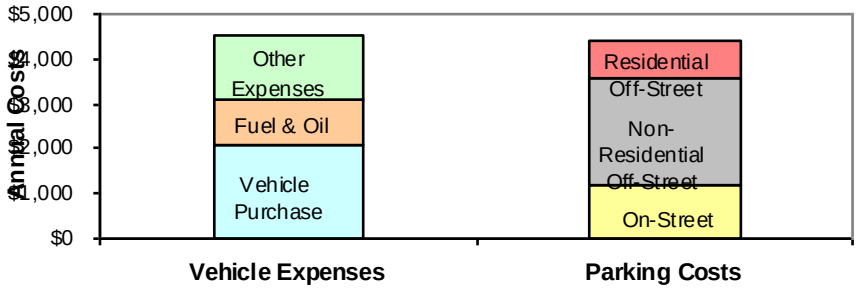
This table estimates parking costs per vehicle. Users pay directly for only about a quarter of total parking costs. The rest are borne indirectly through taxes, reduced wages, and additional retail prices.

Shoup estimates that unpriced off-street parking costs between $127 billion and $374 billion annually in the US.[26] Including on-street parking probably raises this $500 billion annually, more than three times total expenditures on public roads, and more than half as large as total expenditures on private vehicles. For each dollar motorists spend directly on their car somebody bears more than 50¢ in parking costs. This does not include indirect and non-market costs, such as the additional stormwater management costs, heat island effects, and other environmental costs that result when open space is paved for parking.

Parking costs can be a significant portion of facility development costs and rents. Parking represents about 10% of typical building development costs, and sometimes more, particularly for urban redevelopment and suburban projects with relatively high land or environmental costs. For example, a study of the effects of introducing parking requirements in Oakland California shows that construction costs per apartment increased 18% and density decreased 23%.[27] Generous parking requirements reduce the supply of affordable housing, and shifts affordable housing to less accessible sites where land prices are lower but fewer services can be reached by walking or public transit.[28]

[26] Donald Shoup (2005), *The High Cost of Free Parking*, Planners Press (www.planning.org). p. 218.
[27] Brian Bertha (1964), "Appendix A" in *The Low-Rise Speculative Apartment*, by Wallace Smith. Cited in Donald Shoup (2005), *The High Cost of Free Parking*, Planners Press (www.planning.org). pp. 143-144.
[28] Wenya Jia and Martin Wachs (1998), *Parking Requirements and Housing Affordability*, Research Paper 380, University of California Transportation Center (www.uctc.net).

Figure 5.4.3-4 **Comparing Vehicle and Parking Costs**



U.S. motorist spend an average of about $4,500 annually per vehicle on direct expenses.[29] *There are an estimated five parking spaces per vehicle with total annualized costs of $4,400, much of which consumers bear indirectly*[30].

Calculations of per-vehicle parking costs and revenues should take into account *load factors*, that is, the portion of parking spaces that are used at a particular time, or the portion of hours or days per year that a space is used. For example, if parking spaces rent for $60 per month with a 50% average load factor, revenues average $30 per space.

A reduction in parking demand does not always provide a comparable cost savings. For example, if a business has abundant parking supply there may be no immediate parking cost savings if employees shift to alternative commute modes. Their parking spaces will simply be empty. However, over the long run virtually all parking facilities have an opportunity cost: reduced demand reduces parking congestion (for example, parking become more convenient for customers), avoids the need to increase parking supply (for example, if a business expands, or a new business is established nearby), excess spaces can be rented to other nearby users who need them, or the land can be converted to another use (sold, used for an additional building, or converted to greenspace).

When evaluating parking cost savings it may be appropriate to apply an adjustment factor to reflect the lag time between when parking demand is reduced and savings are fully captured. For example, if a commute trip reduction program reduces parking demand by 20 spaces, each with a $1,000 annualized value, it is possible that during the first year only half the potential savings will be captured (20 x $1,000 x 0.5 = $10,000), because the freed-up spaces have no immediate use. However, within two to five years alternative uses will usually be found (the need to expand other parking lots can be avoided, or the land converted to other uses), so the full $20,000 annual value will be achieved.

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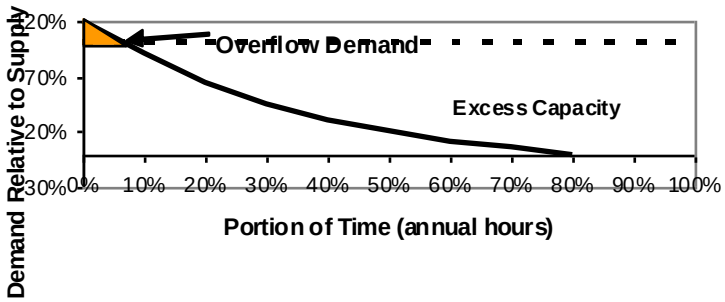
[29] BLS (2004), Consumer Expenditure Survey, (www.bls.gov). Values adjusted by CPI to 2007 USD.
[30] From Table 5.4.3-5 above.

Parking demand reductions tend to provide economic savings more quickly in denser, growing areas with parking problems (where reduced parking demand provides direct benefits in reduced parking congestion and avoided costs for increasing supply), and more slowly in economically stagnant areas which have abundant parking supply and low land costs. This is also affected by parking regulation flexibility (whether businesses may reduce their parking supply if demand declines), and whether it is common for businesses in an area to share, lease or sell excess parking to other users.

Parking Space Valuation

It is sometimes useful to calculate the marginal value of parking spaces. For example, a planner or developer may need to determine how many spaces to supply at a particular destination. A simple, but inaccurate approach is to calculate *average* benefits provided by a group of parking spaces. For example, the value of each parking space at a store would be calculated by dividing total store revenue by the total number of parking spaces to determine average revenue per space. If the store earns $100,000 per day and has 100 parking spaces, each space would be considered to generate $1,000 per day.

Figure 5.4.3-5 **Typical Parking Facility Occupancy**



This figure indicates the portion of available parking spaces occupied over a year for a typical parking facility. Most facilities only fill a few hours each year, and usually have excess capacity.

However, in most cases it is more appropriate to use *marginal* analysis, the incremental benefit of each space. Motorists usually use the most convenient parking spaces, typically those located closest to building entrances. Out of 100 parking spaces serving a destination such as a store, a few (perhaps 20-40) are typically used most, while other spaces (the remaining 60-80) are only occupied during peak periods, as indicated by Figure 5.4.3-5. If inadequate parking is a constraint on business activity the marginal value may be high, because adding a parking space may increase business, but in many situations, parking supply can be reduced with little or no cost, particularly if parking management strategies are implemented.[31]

[31] VTPI (2005), "Parking Management," *Online TDM Encyclopedia*, VTPI (www.vtpi.org/tdm).

5.4.4 Other Estimates

Note: Although many of these estimates are presented in per mile units, the cost is better measured per trip, since parking costs are unaffected by trip length. All monetary units are in U.S. dollars unless indicated otherwise.

Summary Table of Parking Cost Estimates

Table 5.4.4-1 **Parking Cost Estimate Summary Table – Selected Studies**

Publication	Costs	Cost Value	2007 USD
Apogee Research (1994)	Per mile (Boston, MA)	$0.18 (1994 USD*)	$0.25 per mile
	Per mile (Portland, ME)	$0.043	$0.06 per mile
Cambridge Systematics (1998)	Surface stall	$68 / month (1997 USD)	$88 per month
	Above ground structure	$135	$174 per month
	Below ground	$240	$310 per month
Delucchi (1996)	Total US unpriced non-residential	$148-$288 billion (1991 USD)	$225 - $438 billion per year
	Subsidy per motor vehicle year	$788 - $1531	$1,198 - $2,327 per vehicle year
	Non-residential subsidy per vehicle mile	$0.063 - $0.133	$0.10 - $0.20 per mile
Greenberg (2005)	Increase in housing unit cost per residential space	$52,000 to $117,000 (2005*)	$54,000 to $120,000
Shoup (2005)	Per space in structure	$127 (2002 USD/month)	$149 per month
	Per mile	$0.22	$0.26 per mile

More detailed descriptions of these studies are found below, along with summaries of other studies. 2007 Values have been adjusted for inflation by Consumer Price Index[32]*. * Indicates that the currency year is assumed to be the same as the publication year.*

General and Non-Residential Studies

- A study by Barter investigated parking regulations, supply, pricing and management practices in various Asian cities including Beijing, Guangzhou, Hong Kong, Seoul, Taipei, Tokyo, Ahmedabad, Dhaka, Bangkok, Hanoi, Jakarta Kuala Lumpur, Manila and Singapore.[33] It found that, although these cities are very dense, with high land values and intense congestion, most cities have adopted Western practices designed to insure adequate parking supply and low prices. Parking pricing is widespread, although poorly regulated and sometimes collected by criminals. Nevertheless, the study found a surprising proportion of parking is free-of-charge for motorists, even in dense cities with high property prices and therefore high opportunity cost for parking space.

[32] For discussion of other way to adjust for inflation see: Samuel H. Williamson (2008), *Six Ways to Compute the Relative Value of a U.S. Dollar Amount*, MeasuringWorth (www.measuringworth.com).
[33] Paul Barter (2010) *Parking Policy in Asian Cities*, Asian Development Bank (www.adb.org); at https://docs.google.com/leaf?id=0ByEszG9z8sBUYTBhNzdmZmQtNjc3Zi00MmRkLWIzMWEtZWUxNGY0ODJmODRi&hl=en&authkey=CN6Rg-0J.

- Chester, Horvath and Madanat calculate parking facilty lifecycle energy consumption, greenhouse gas and air pollution emissions (CO, SO_2, NO_X , VOC, and PM_{10}) based on five parking supply scenarios.[34] The results are incorporated into their life-cycle environmental analysis of various vehicles (sedans, sports utility vehicles, and pickups). Parking energy consumption is estimated to average from 14–18 kJ/Passenger-Km (Scenario 1) to 240–310 kJ/Passenger-Km (Scenario 5), and GHG emissions range from 1.3–1.7 gCO_2e/PKT (Scenario 1) to 19–25 g CO_2e/PKT (Scenario 5). This represents 0.5% to 12% of total estimated transport system lifecycle energy consumption and greenhouse emissions, and 24% to 81% other air pollutants, depending on vehicle type and scenario.

- In a study of parking supply and demand in Hulme-Moir found that charging users directly for parking would increase the financial cost of driving 30-90% for an average shopping trip and about 100% for an average commuting trip, and that about a quarter of central city area land is devoted to parking facilities .[35]

- The National Parking Association's *Parking In America; Annual Review of Parking Rates in the United States and Canada* includes information on parking facility costs, employee wages, and hourly, daily and monthly rates for commercial parking in various North American cities.[36] The 2009 study found:
    - Parking garage construction costs range from $2,000 to $45,000 per space, with an average of $19,650 per space.
    - Surface parking lot construction costs ranged from $1,000 to $15,000 per space, with an average of $5,000 per space.
    - Condomenium parking space prices ranged from $17,000 to $100,000, with an average price of $45,400.
    - Average starting hourly wage of parking facility employees ranged from $5.85 to $12.50, with an average of $8.30.

- Colliers International publishes parking fee data in different cities, indicating how prices vary depending on location and type of parking used.[37]

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[34] Mikhail Chester, Arpad Horvath and Samer Madanat (2010), "Parking Infrastructure: Energy, Emissions, And Automobile Life-Cycle Environmental Accounting," *Environmental Research Letters*, Vol. 5, No. 3; at http://dx.doi.org/10.1088/1748-9326/5/3/034001; project of the UC Berkeley Center for Future Urban Transport (www.sustainable-transportation.com).

[35] Angus Hulme-Moir (2010), *Making Way for the Car: Minimum Parking Requirements and Porirua City Centre*, Thesis, School of Geography, Environment and Earth Sciences, Victoria University of Wellington (http://researcharchive.vuw.ac.nz/handle/10063/1458).

[36] NPA (2009), *Parking In America, The National Parking Association's First Annual Review of Parking Rates in the United States and Canada*, National Parking Association (www.npapark.org); at www.npapark.org/pdfs/NPA_Full_Report_Web_Resolution.pdf.

[37] Colliers (2009), *Global CBC Parking Rate Survey*, Colliers International (www.colliers.com); at www.colliersmn.com/PROD/ccgrd.nsf/publish/0EB9D100B7A442F8852575F600699A07/$File/globalcolliersparkingratesurvey2009.pdf.

- Cambridge Systematics estimated parking costs as summarized in the table below.

Table 5.4.4-3 **Total and Monthly Costs per Parking Space (1997 U.S. Dollars)**[38]

	Surface Lot			Above-Ground Multi-Level Structure			Below Ground		
	Low	High	Average	Low	High	Average	Low	High	Average
Land	$600	$12,000	$6,300	$500	$1,000	$750	$0	$0	$0
Construction	$1,500	$4,000	$2,750	$8,800	$20,000	$14,400	$16,000	$40,000	$28,000
Design, Contingency	$200	$800	$500	$1,800	$5,000	$3,400	$3,200	$10,000	$6,600
Present Value	$2,300	$16,800	$9,550	$12,100	$26,000	$19,050	$19,200	$50,000	$34,600
Interest Payments	$2,100	$14,700	$8,400	$9,700	$22,700	$16,200	$16,800	$43,700	$30,250
Operating Costs	$700	$2,800	$1,750	$2,800	$5,600	$4,200	$2,800	$5,600	$4,200
Break-Even Cost	$5,100	$34,300	$19,700	$24,600	$53,300	$38,950	$38,800	$99,300	$69,050
Monthly Equivalent	$18	$119	$68	$85	$185	$135	$135	$345	$240

This table summarizes total costs amortized over a 24-year service life at a 9% annual interest.

- Delucchi estimated that non-residential, unpriced, off-street parking has a total value of $148 to $288 billion (in 1991 U.S. dollars) as summarized in Table 5.4.4-4. This represents a subsidy averaging $788 to $1,531 per motor vehicle year, or 6.3¢ to 13.3¢ per motor vehicle mile (in 1991 dollars).

Table 5.4.4-4 **Calculated Value of Unpaid Parking**[39]

Cost Item	High	Low
Workers 16 years old or older (millions)	115.1	115.1
Of total workers, the fraction that uses motor vehicles	0.866	0.866
Persons per vehicle, for commute trips	1.14	1.14
Of those who drive to work, the fraction that parks free on the street	0.10	0.05
Of those who drive to work, the fraction that pays for parking	0.048	0.048
Calculated average monthly parking rate, excluding taxes ($/month)	42.4	62.7
Total potential revenues from unpriced commuter parking, net taxes (Billions $/year)	37.9	59.3
Non-commute trips that require offstreet, non-residential parking (10^6)	73,796	93,457
Fraction of total vehicle trips that pays full cost for parking	0.04	0.02
Calculated average hourly parking rate, excluding taxes	0.78	1.00
Average time spent in parking space per trip (hours)	2.00	2.50
Potential revenues from unpriced parking for other purposes (billions $/year)	110.3	228.6
Total potential revenues from unpriced parking, excluding taxes (billions $/year)	148.2	287.9
Total calculated payments for presently priced parking, excluding taxes	6.73	7.82
Total potential revenues from parking for all trips, excluding taxes (billions $/year)	155.0	295.8

This table summarizes the estimated value of non-residential, unpriced, off-street parking.

[38] Richard J. Kuzmyak, Rachel Weinberger and Herbert Levinson (2003), *Parking Management and Supply*, TCRP Report 95, Chapter 18, TRB (www.trb.org), based on Cambridge Systematics (1998), *Economic Impact Analysis of Transit Investments*" TCRP 35, TRB (www.trb.org).
[39] Delucchi (1996), *Annualized Social Cost of Motor-Vehicle Use in the U.S., 1990-1991*, Vol. 6, Institute of Transportation Studies (http://engineering.ucdavis.edu/), UCD-ITS-RR-96-3 (6), Table 6-B.1.

- A 1995 study estimates that businesses provide 294 million parking spaces to employees and 39 million parking spaces to customers.[40] Assuming $500 average annualized value per parking space and a 3% annual growth rate, this indicates approximately $200 billion in annualized value in 2000.

- Manville and Shoup estimate parking spaces per hectare and job in various central business districts in the world, and calculate a *parking coverage rate*, the portion of downtown that would be devoted to parking if all parking were provided in surface lots.[41] This varies from under 10% to more than 80%. They argue that a high parking coverage rate tends to spoil many desirable urban environment attributres, including walkability and cost efficiency.

- Russo estimates the costs of different types of parking facilities, as summarized in the table below. It indicates that urban surface parking typically costs about $10,000 per space, and structured parking costs two to four times as much.

Table 5.4.4-5 **Selected Examples of Parking Facility Costs**[42]

Per Space	Cost Components	Description
$10,000	Surface parking construction costs (Excludes land)	Average from national survey of public garage costs, adjusted for Bay Area costs
$14,000	Construction costs of above ground structures. (Excludes land and architectural fees.)	Average from national survey of public garage costs, adjusted for Bay Area costs. Excludes sprinkler and ventilation system costs required for underground parking.
$9,450	Land costs.	Assuming a parking space averages 315 square feet (including access lanes) and land costs $30 a square foot, land alone for parking costs nearly $10,000 per space.
$25,600	Parking Garage. Per space added (Includes land.)	Average cost per space added (in 1998 dollars) of six parking structures built on the UCLA campus since 1977.
$17,848 $16,373 $13,000 $6,751 $8,500 $10,000	Palo Alto Walnut Creek Mountain View Mill Valley Concord Berkeley	In-Lieu Parking Fees. Cities sometimes allow developers to pay the amount listed at left per space they are required to build as per the zoning code in-lieu of building the space. Since in-lieu fees fund public parking construction, they are a proxy of cost per space
$39,000 or $46,000	Housing prices (condominium and single family unit).	The increased market price per housing unit that includes a parking space compared to housing that does not.
$50,700	Design, administration, construction and financing	Two new parking garages in downtown Palo Alto providing 905 spaces cost a total of $45.9 million.

This survey of parking facility costs indicates that urban surface parking typically costs about $10,000 per space, and structured parking two to four times as much.

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[40] KPMG study, described in Richard J. Kuzmyak, Rachel Weinberger and Herbert S. Levinson (2003).
[41] Michael Manville and Donald Shoup (2005), "People, Parking, and Cities," *Journal Of Urban Planning And Development*, American Society of Civil Engineers (www.asce.org), December, pp. 233-245; at http://shoup.bol.ucla.edu/People,Parking,CitiesJUPD.pdf; in *Access 25* (www.uctc.net), Fall 2004, pp. 2-8.
[42] Ryan Russo (2001), "Examples of Parking Costs," *Planning For Residential Parking: A Guide for Housing Developers and Planners*, Nonprofit Housing (www.nonprofithousing.org).

- Shoup estimates that providing minimum parking requirements costs an average of $31 or more per square foot of developed building floor area in typical U.S. cities, 4.4 times more than all other impact fees combined.[43] He identified various costs resulting from subsidized parking, including increased parking and travel demand, urban sprawl, higher development costs, reducing housing affordability, and inequity.[44] He estimates that parking costs average $12,000 per vehicle (about twice the value of a vehicle), and external parking costs total $127-374 billion in the U.S., more than the value of the total roadway system, averaging more than 22¢ per vehicle mile.

- Richard Willson estimates the monthly cost that developers would need to charge for "free" suburban surface and structure parking to be approximately $50 and $100 per space, but because generous parking requirements lead to tremendous oversupply, the "utilization-adjusted break-even fee" would be about twice these amounts, $92 per for surface parking and $161 per for structure parking.[45]

- Transport 2021 estimates residential parking stall costs average $746 Canadian per house and $743 per apartment. Total parking costs average 3.7¢ total Canadian per km (about 4.6¢ U.S. per mile).[46]

- The average cost of providing a parking space in the Vancouver, BC region (not just the CBD) is about $115 Canadian ($80 U.S.) per month.[47]

- Woudsma, Litman, and Weisbrod developed practical methods for quantifying the values of land used for transport facilities, including roads, railroads, ports and airports.[48] They use property value data to calculate average land values in geographic zones, with separate techniques for urban and rural conditions to reflect land markets and data availability differences. The results indicate that urban land values typically range from $100 to $200 per square meter, and rural land from $0.40 to $0.60 per square meter (2000 Canadian dollars).

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[43] Donald C. Shoup (1999), "In Lieu of Required Parking," *Journal of Planning Education and Research*, Vol. 18, pp. 307-320.
[44] Donald Shoup (2005), *The High Cost of Free Parking*, Planners Press (www.planning.org).
[45] Richard Willson (1995), "Suburban Parking Requirements; A Tacit Policy for Automobile Use and Sprawl," *American Planning Association Journal* (www.planning.org), Vol. 61, No. 1, Winter, pp. 29-42.
[46] Transport 2021 (1993), *Costs of Transportation People in the British Columbia Lower Mainland*, Greater Vancouver Regional District, (Vancouver), pp. 13-16.
[47] Urban Systems (1996), *A Comprehensive Parking Management Strategy*, Greater Vancouver Regional District (www.gvrd.bc.ca).
[48] Clarence Woudsma, Todd Litman, and Glen Weisbrod (2006), *A Report On The Estimation Of Unit Values Of Land Occupied By Transportation Infrastructures In Canada*, Transport Canada (www.tc.gc.ca); at www.tc.gc.ca/pol/en/aca/fci/transmodal/menu.htm.

Residential

- Greenberg estimates that each additional residential parking space effectively increases typical U.S. urban housing unit costs by $52,000 to $117,000, with a mid-range value of $85,627. These figures are derived from observed differences in housing prices, reduced loan eligibility because of increased car-related household costs, public infrastructure costs associated with accommodating developments that are more dispersed due to parking requirements, and direct financial impacts on neighbors of new developments.[49]

- Klipp found the financial return to Bay Area developers per square unit of parking is much less (about half) the return of housing, because minimum parking requirements in zoning codes and other market distortions require far more parking than consumers demand (that is, what they would choose to purchase if optional).[50] He estimates that developers must charge at least 27.5% more to get the same per-square foot rate of return on housing with versus without parking. The lower financial return constrains developers' lending options and reduces construction of new housing, particularly lower-priced housing in urban areas with high land costs.

Stormwater Management

The Project Clean Water (www.projectcleanwater.org) describes stormwater district fees summarized in the table below. If these fees represent real stormwater management costs and an average off-street parking space requires 333 square feet of pavement, these costs range from about $1-7 per off-street parking space.

Table 5.4.4-6 **Water District Funding Sources Based on Impervious Surface**[51]

Location	Fee	Annual Fee/333 sq. ft.
Chaple Hill, NC	$39 annual 2,000 sq. ft.	$6.50
City of Oviedo Stormwater Utility, FL	$4.00 per month per ERU	$5.00
Columbia Country Stormwater Utility, GA	$1.75 monthly per 2,000 sq. ft.	$3.50
Kitsap County, WA	$47.50 per 4,200 sq. ft.	$4.00
Raleigh, NC	$4 monthly per 2,260 sq. ft.	$6.00
Spokane Country Stormwater Utility, WA	$10 annual fee per ERU.	$1.00
Wilmington, NC	$4.75 monthly per 2,500 sq. ft.	$7.50
Yakima, WA	$50 annual per 3,600 sq. ft.	$6.50

"Equivalent Run-off Unit" or ERU = 3,200 square foot impervious surface.

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[49] Allen Greenberg (2005), *How New Parking Spaces May Effectively Increase Typical U.S. Urban Housing Total Unit Costs by $52,000 to $117,000*, TRB 84th Annual Meeting (www.trb.org).
[50] Luke Klipp (2004), *The Real Costs Of San Francisco's Off-Street Residential Parking Requirements: An Analysis Of Parking's Impact On Housing Finance Ability And Affordability*, Transportation for a Livable City (www.livablecity.org); at www.livablecity.org/resources/Parking_Housing_Affordability_Final.pdf
[51] Project Clean Water (2002), *Some Existing Water District Funding Sources*, Legislative and Regulatory Issues Technical Advisory Committee, Project Clean Water (www.projectcleanwater.org).

5.4.5 Variability

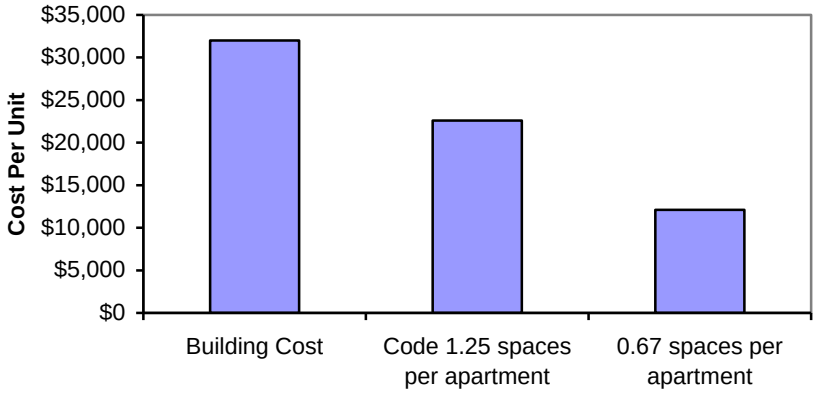
Parking costs and the portion that is external varies depending on location and use. Parking facility costs tend to high in central business districts, due to high land prices, although a greater portion of such parking is directly user paid. Parking costs tend to be relatively high per commute trip since employees use a space for several hours. Non-commute parking costs probably equals or exceeds that of commuter parking.

5.4.6 Equity and Efficiency Issues

Excessive parking requirements have a number of effects that increase housing costs and the overall cost of living in cities. Some of these costs directly add to the cost of housing, such as construction costs for parking structures in new residential construction. Other costs are indirect such as the public land and funds used to provide parking at non-residential facilities, land and funds which are not then available for other public purposes such as providing affordable housing or public transit.

One of the most obvious impacts of parking requirements is the direct construction costs paid by the funders of non-profit housing projects. Extreme examples arise where parking requirements are tied to the number of units in a building, and the unit sizes are very small. For example, in Palo Alto California in 1998 a development with 260 square foot apartments managed to get the parking requirement reduced from the normal 1.25 spaces per one-room apartment to 0.67 spaces. At a construction cost of $32,000 per apartment and $18,100 per parking spot, it would have cost $22,600 to provide parking for each $32,000 apartment, 71% as much as the cost of building the apartments. With the reduced requirements, parking still cost $12,100 per apartment, or 38% of the apartment construction cost, as shown below in Figure 5.4.6-1

Figure 5.4.6-1 **Reduced Parking Requirement Savings**[52]



Despite a substantial reduction in the parking required, parking still accounted for 38% of the building cost. Note that this is an extreme example as the apartments are very small.

[52] Donald Shoup (2005), *The High Cost of Free Parking*, Planners Press (www.planning.org). p151

Since parking costs increase as a percentage of rent for lower priced housing, housing represents a larger portion of household expenditures for poorer households, and vehicle ownership increases with income, parking costs are regressive and unfair to many lower-income households that own fewer than average cars. Current parking standards are an ineffective mechanism for matching parking supply with demand because the number of vehicles per housing unit varies significantly between households and over time. Various parking management strategies can increase affordability, economic efficiency and equity.[53]

[53] Todd Litman (2008), Parking Management *Strategies, Evaluation and Planning*, Victoria Transport Policy Institute (www.vtpi.org); at www.vtpi.org/park_man.pdf

5.4.7 Conclusions

Parking is a substantial cost of driving, much of which is external. To avoid double counting costs in chapters 5.1 and 5.6, out-of-pocket parking charges and the costs of providing on-street parking are excluded from this chapter's cost estimates here. Only market costs are considered because non-market costs are included in chapters 5.14 (Land Use Impacts), and 5.15 (Water Pollution and Hydrologic Impacts).

Internal Parking Costs: To avoid double counting user parking fees that are included in Chapter 5.1, only residential parking costs are considered here. An Average Automobile residential parking space is estimated to cost approximately $950 per year, or 8¢ per mile for a vehicle driven 12,000 miles per year. Some residents park their cars on the street, but this seems to be balanced by others who have more off-street parking spaces than cars, so one off-street space is assumed to exist for each registered automobile. Rural parking space costs are estimated at half of urban due to lower land values.

Compact cars can use "Small Car" spaces, offering an estimated 20% space savings 25% of the time, for 5% total saving. Ride share passengers, buses and trolleys incur no incremental parking cost.[54] Motorcycles are estimated to use half-size parking spaces 50% of the time, for a 25% saving over an automobile, while bicycle parking costs are estimated at 5% of an automobile, due to minimal space requirements, and the ability to use otherwise unused space. Walking and telework incur no parking cost.

Estimate **Internal Parking Costs (2007 U.S. Dollars per Vehicle Mile)**

Vehicle Class	Urban Peak	Urban Off-Peak	Rural	Average
Average Car	0.080	0.080	0.040	0.067
Compact Car	0.072	0.072	0.037	0.061
Electric Car	0.080	0.080	0.040	0.067
Van/Light Truck	0.080	0.080	0.040	0.067
Rideshare Passenger	0.000	0.000	0.000	0.000
Diesel Bus	0.000	0.000	0.000	0.000
Electric Bus/Trolley	0.000	0.000	0.000	0.000
Motorcycle	0.064	0.064	0.032	0.053
Bicycle	0.005	0.005	0.002	0.003
Walk	0.000	0.000	0.000	0.000
Telework	0.000	0.000	0.000	0.000

External Parking Costs: Most estimates place off-street parking costs around or over $1100 per year or $4.00 per day per space. The $4.00 average parking space cost is divided by 22 average commute miles and subtract 8% for commuter paid parking, which gives an estimated average external commute parking costs of 16.7¢ per commute mile. Based on these estimates, 17¢ per commute mile is used for Urban Peak driving. Commercial parking subsidies are estimated to total $115 billion. Subtracting the $55 billion estimated for work parking from this figure leaves $60 billion. Divided by 1,840

[54] Curbside bus stops use space that might otherwise be available for on-street parking, but this is considered a road cost rather than a parking cost.

billion Urban Off-Peak and Rural miles, this averages about 3¢ per vehicle mile. An estimate of 6¢ is used for Urban Off-Peak driving and 3¢ for Rural driving, to represent differences in land value.

External Parking Costs: Conservative estimates place average off-street parking costs around $1000 per year or $3.75 per day per space, and place total U.S. employee parking subsidies at between $65 and $95 billion per year. A value of $70 billion is used. Dividing that amount by 460 billion peak period[55] miles gives an average employee parking subsidy of 15¢ per commute mile. An alternative approach is to divide the $3.75 average parking space cost by 22 average commute miles and subtract 8% for commuter paid parking, which gives an estimated average external commute parking costs of 15.7¢ per commute mile. Based on these estimates, 15¢ per commute mile is used for Urban Peak driving. Commercial parking subsidies are estimated to total $150 billion. Subtracting the $70 billion estimated for work parking from this figure leaves $80 billion. Divided by 1,840 billion Urban Off-Peak and Rural miles, this averages about 4¢ per vehicle mile. An estimate of 5¢ is used for Urban Off-Peak driving and 2.5¢ for Rural driving, to represent differences in land value.

As described above compact cars, motorcycles, and bicycles are estimated to be 5%, 25%, and 95% cheaper to park than an average automobile. Rideshare passengers, buses, trolleys, walking and telework incur no user parking costs.

Estimate **External Parking Costs (2007 U.S. Dollars per Vehicle Mile)**

Vehicle Class	Urban Peak	Urban Off-Peak	Rural	Average
Average Car	0.150	0.050	0.025	0.062
Compact Car	0.143	0.047	0.024	0.059
Electric Car	0.150	0.050	0.025	0.062
Van/Light Truck	0.150	0.050	0.025	0.062
Rideshare Passenger	0.000	0.000	0.000	0.000
Diesel Bus	0.000	0.000	0.000	0.000
Electric Bus/Trolley	0.000	0.000	0.000	0.000
Motorcycle	0.113	0.037	0.018	0.046
Bicycle	0.008	0.003	0.001	0.003
Walk	0.000	0.000	0.000	0.000
Telework	0.000	0.000	0.000	0.000

Automobile Cost Range: Minimum and maximum estimates per vehicle mile are based on cited estimates.

	Minimum	Maximum
Internal	$0.04	$0.12
External	$0.05	$0.14

[55] Urban Peak travel is used to represent commuting in this exercise. Although total mileage has increased, the portion of urban-peak is similar. Dollar values are adjusted by consumer price index to 2007 values.

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ADAPTIVE PARKING: A FLEXIBLE FRAMEWORK FOR PARKING REFORM

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Abstract. Adaptive Parking is a framework for parking reform aimed at addressing both acute parking problems and the more chronic issue of car dependence in parking without necessarily imposing restrictions on parking supply. It is an extension and generalisation of parking policy proposals in Donald Shoup's "High Cost of Parking". Adaptive Parking contrasts with both of the main paradigms in parking policy. In other words, it requires different thinking about parking, not just different policies. Adaptive Parking is part of a third paradigm that emphasises market responsiveness rather than specific planned outcomes. It involves five reform thrusts that work together to gradually enable greater adaptability in parking systems. The Adaptive Parking policy agenda can be adapted to a wide range of circumstances.

INTRODUCTION

This paper aims to challenge your assumptions. Even if you already support parking reform, don't assume that you already know what this paper will argue.

Most places currently plan parking like they plan toilets, placing faith in standards that require a certain number of parking spaces with every new building. This works well for toilets so that, at relatively low cost, most cities avoid public urination and defecation.

However, the same approach for parking (the 'conventional' approach) is much less successful than many people assume. Compelling parking construction with buildings (a practice that arose in the USA mid-20th century) generally fails on its stated aim of preventing parking problems in the streets. It succeeds only when complemented by strong on-street parking management or in ultra-low-density areas planned around car use, where parking requirements are taken to extremes.

You might say that such failures imply that parking minimums should often be higher. But ensuring 'enough' parking is vastly more costly and space-consuming than ensuring adequate bathroom facilities. This also ignores the fact that parking demand is much more malleable than the demand for toilet facilities.

Yet, there is much confusion over how else to do parking policy. Many assume that any reform away from conventional parking policy must involve the very opposite - aggressive restrictions on private vehicles. The focus of this paper, "Adaptive Parking", is indeed a significant departure from the conventional approach but it is not focused on restraining cars. It does not (necessarily) involve restricting parking supply or force mode shifts.

Nevertheless, by making parking more responsive to local conditions, Adaptive Parking offers an alternative to fear-based over-supply and over-planning of parking that locks an unchangeable over-supply of parking into the landscape, regardless of changing transport preferences and urban market trends.

WHY PARKING REFORM?

As mentioned above, most parking policy worldwide is modelled on the USA's conventional suburban approach. It is the dominant approach in Oceania, Latin America, Southeast Asia, and South Asia and even across most of Europe, at least outside the inner cities (Barter, 2011; Rios Flores et al., 2013).

This conventional approach assumes that parking in the streets is inevitably difficult to manage. So it tries to ensure every site has "enough" parking. Parking space with buildings is mandated via standards (minimums) as part of the zoning or building codes. These try to avoid having parking spill beyond the site. It is feared that such 'spillover' will create unacceptable parking problems in nearby streets and neighbouring sites.

The conventional approach assumes that the private sector will not supply enough

parking unless forced to. But its parking requirements typically result in oversupply and hence off-street parking prices that are far below cost recovery (and often zero). The assumption thus becomes a self-fulfilling prophecy.

Parking minimums often fail on their central stated aim of easing on-street parking problems. Mandated off-street supply do not magically attract motorists away from the apparent convenience of free or underpriced, little-managed on-street parking. Parking studies all over the world repeatedly find busy areas with parking chaos in the streets, yet with nearby off-street parking that is under-used (for example, ITDP and Nelson\Nygaard, 2009).

Parking chaos in the street does indeed have severe impacts on pedestrians and buses with serious congestion side effects from the parking search traffic, double parking and vehicles waiting for parking (Shoup, 2005). But off-street parking supply does not magically solve such chaos if on-street parking remains poorly managed. Waiting for off-street supply to appear with new buildings is a distraction from the crucial task of improving the management of the on-street parking itself.

The conventional approach also means every customer and every tenant pays towards the cost of parking, even if they don't own a vehicle and don't drive. Excessive parking minimums force regressive and inefficient cross-subsidies into the system by shifting the real and significant cost of providing parking from its users to real-estate investment and hence to everyone (see for example, Shoup, 2005, among many others).

The 'infrastructure' thinking on parking demand in the Conventional perspective has a strong tendency to generate oversupply. When setting minimums, 'enough' parking is usually taken to mean that demand for FREE parking should be met within every site even at the busiest times in the week or year. Even in places where parking prices are not zero, the conventional mindset seems to ignore the prices when setting parking minimums. For example, Hong Kong parking prices are high, yet prices were hardly mentioned at all in two major reviews of parking demand to update the parking standards (Barter, 2011). Strangely, it seems to be tacitly assumed that such prices will remain unchanged, so ignoring the potential for market-based price rises to manage demand.

Donald Shoup has called parking minimums a 'fertility drug for cars'. By forcing extra parking supply and hiding and dispersing its costs, the conventional approach lowers the perceived cost of vehicle ownership and use, thereby generating traffic growth.

Parking minimums can have disastrous results if applied rigidly to older areas with a stock of old buildings on modest sized lots. Such locations would usually be expected to see cycles of redevelopment. Locations with good access by public transport would expect intensification. But minimum parking requirements can help block these processes. Requiring small lots to provide ample on-site parking renders uneconomic the re-use, redevelopment, infill of many sites. Conventional parking policy has played a key role (among other factors) in generating blight in the cores of American cities, many of which are now dominated not by buildings but by open-lot parking (Jakle and Sculle, 2004).

Parking supply mandates also harm housing affordability by inflating the cost of housing and by reducing the supply that can economically be built (Shoup, 2005). The impact of rigid parking minimums on housing costs is dramatic for small units and small sites.

Rigid minimum parking requirements are an obstacle to transit-oriented development and undermine the transit-orientation of whatever TOD is built. Dense development with excessive parking generates excessive traffic, fuelling traffic-related fear of increasing densities.

Conventional parking policy pushes newly motorizing cities towards automobile dependence. Examples abound in developing Asia. And it helps entrench the existing automobile dependence of metropolitan areas in Australia and North America.

Even many cities with more balanced transport systems have surprisingly conventional approaches to parking. This is an alarming anomaly for places such as Singapore, Hong Kong, Seoul and many European cities, since such parking policies promote private vehicle ownership and use, undermining these cities' efforts to build up alternatives.

A "MAP" OF REFORM OPTIONS

It is often assumed that there is just a single alternative to the wasteful version of the conventional approach which was criticised above. In fact, there are several distinct directions that parking reform efforts can take (Barter, 2010). These involve contrasting ways of thinking about parking.

This section provides a framework for understanding these alternatives as illustrated in Figure 1. This is not the usual way to group parking policies. Other observers categorise parking policies based mainly on their attitude to supply. For example, Todd Litman (2006) talks of an 'old' parking paradigm (which is supply-focused and assumes demand cannot easily be modified) and a 'new' one (which is suspicious of adding supply and is more willing to manage demand).

However, the framework in Figure 1 involves two dimensions. The first is whether parking is seen as something to be provided site-by-site versus serving a whole area. The second dimension is whether parking is viewed as 'infrastructure' (requiring strict government planning and regulation) or as a kind of real estate (or real-estate based service). The resulting two-way matrix has three parking policy paradigms, with one empty box (which seems to be an impossibility).

The conventional approach, described above, has a mindset that assumes parking should be thought of as on-site infrastructure (like the toilets with a building). As *infrastructure*, it is seen as something which needs to be planned by government and which cannot be left to private initiative alone. As *on-site* infrastructure, is has to go with every building, with spillover minimized. The alternative approaches shown below involve mindsets that differ on one or both of these assumptions.

	Every site should have its own parking	**Parking facilities serve whole neighbourhoods**
Parking is "infrastructure"	1. **Conventional**	2. **Parking Management**
Parking is a "real-estate based service"	*no examples*	3. **Responsive** (including Adaptive Parking)

Figure 1 A simple framework for categorising parking policy alternatives

ALTERNATIVES: MODERATING THE CONVENTIONAL APPROACH

The least radical kinds of reform merely reduce wastefulness in the 'conventional' box.

Some such reforms aim to avoid excessive supply rather than just avoiding shortage. This involves taking more care to adjust local parking minimums according to context, as in the push to 'right size' parking standards (see for example, Engel-Yan and Passmore, 2010).

Another way to moderate the conventional approach is to allow flexibility. Many cities allow exemptions where meeting the mandates would be excessively expensive, usually with some payment-in-lieu of parking provision. Allowing shared or off-site parking to count towards required parking is another example of flexibility.

These reforms retain the assumptions of the conventional approach but accept more risk that parking demand may not be contained on site. This requires a willingness to manage local parking beyond the site, if necessary, to deal with spillover.

In some places, this change in attitude to spillover opens the door to a more radical change in mindset – namely a shift to thinking of parking as a district-by-district not a site-by-site thing. Such a change in mindset opens up the two parking reform directions in the right-hand column of the matrix, as discussed below.

THE UNGLAMOROUS SECRET BEHIND ANY PARKING POLICY SUCCESS

Both of the major alternatives to the conventional approach in Figure 1 involve a shift to seeing parking as serving whole areas, not just specific sites. They accept that some spillover is inevitable. They therefore require on-street management of parking.

So any city that wants to turn away from the conventional approach needs at least the basics of on-street parking management. This opens up parking policy options and frees cities from the trap of the conventional approach.

A city that can't or won't establish effective on-street parking control is stuck with the conventional approach.

Yet, as I argued above, this generally fails to prevent on-street chaos anyway. Even where it succeeds, the cure is worse than the disease, leaving you with a costly, sprawling and car-dependent city that is vulnerable to gasoline supply disruptions.

For parking policy success there is no avoiding the need for better management of on-street parking. This means at least the following: establishing clearer rules (and signs); building enforcement capacity to be 'good enough' for each location (better as an administrative not a law court matter, and better by local government or contractors not by the police); establishing trustworthy time-based fees; and building basic parking data collection capacities.

Many cities do have effective on-street parking management but still retain conventional parking policy, missing the chance to shift to the less wasteful alternatives below.

ALTERNATIVES: THE 'PARKING MANAGEMENT' MINDSET

An interesting thing often happens in the inner areas of large cities, especially in places built up before the rise of cars. As mentioned above, the conventional approach is often unworkable in such places and inner urban authorities still need strong management of on-street parking, since most buildings still lack parking. And many introduce flexibility in their parking minimums because it would be lunacy to do otherwise.

These trends prompt a change of mindset. The assumptions and goals of parking policy change completely. Having gained experience at managing parking in the streets, many such places come to calmly see parking as something that serves the whole neighbourhood, not a specific site. Dropping the preoccupation with sufficiency of supply within each site opens new possibilities.

Without the obsessive focus on on-site parking adequacy, there is also often less emphasis on parking adequacy generally. It may be dropped as a goal completely or it can become just one of several goals.

Such places often then realize that parking can now be used to serve other goals, as they choose. Parking is usually still seen as infrastructure but as district infrastructure, not site infrastructure.

Because planning and managing parking feature strongly in this approach, I use the term '*Parking Management'* for this mindset, in which parking is seen as neighbourhood infrastructure able to serve various objectives. Many tools enable active management of

parking. These include: prices, eligibility, time-limits, design, sharing, parking taxes, and supply investments or limits.

One objective is managing conflict over parking (such as between retailing interests and residents or between employee and retail parking). Some places use subsidized parking supply in an attempt to compete economically with other areas. By contrast, some use limits on parking supply to constrain private vehicle use to certain destinations.

Despite such diversity, the common features that define these as Parking Management, are that parking is actively managed by government as infrastructure, and that there is little or no expectation that each site must handle its own parking. Parking is expected to be public and, regardless of where they park, motorists are welcome to then walk to any destination in the area (or to several). 'Park once districts' become the norm.

Few places with a Parking Management mindset actually abolish parking minimums (Australian city centres, the whole of Berlin and London, and large areas of San Francisco are examples) (Barter, 2013). Instead, the parking requirements usually now trigger payments to the local government *in lieu* of the required parking. For example, many German cities have minimums but in their inner cities they also impose maximums or even bans. The parking minimums determine the in-lieu payments that developers must pay for the required parking that they are not allowed to build (Topp, 1993).

The Parking Management approach works well. It is tried and tested in many cities around the world, especially inner cities all over Europe and in the inner cities of large North American and Australian metropolitan areas. It requires strong management capacities over on-street parking. But, as I argued above, that is the key to ANY parking policy success that escapes from the conventional approach.

However, as a challenge to the Conventional mindset, the Parking Management mindset has some limitations. In practice, it can be complex, resulting in a heavy reliance on specialist consultants. It can also involve a great deal of conflict. While the Conventional approach hides its losers and disperses its costs, the Parking Management mindset requires more explicit trade-offs to be debated. This can be contentious. Furthermore, since many places using this approach still retain parking minimums, at least on paper, there is a tendency for confusion over goals. Finally, the Parking Management approach seems unable to challenge the conventional approach beyond the inner cities.

ALTERNATIVES: "RESPONSIVE" APPROACHES

This third mindset has come to prominence through the work of Donald Shoup (2005), who urges three main reforms for US cities:

1. Have on-street parking prices vary in time and space in order to target 85% occupancy (rising if occupancy is much higher and dropping if it is much lower);

2. Use parking revenue in ways desired by local stakeholders (especially via the

mechanism of 'parking benefit districts', to generate champions for reform);

3. Abolish minimum parking requirements (since the other two reforms should defuse spillover parking, which was the fear that led to the parking mandates).

These proposals point towards 'Responsive' parking approaches in which the supply of parking would reflect private choices that are informed by market-responsive prices and explicit opportunity costs rather than being shaped primarily by planning decisions.

Shoup's suggestions require a mindset shift. We cannot think of parking as building site infrastructure (like toilets and other 'common facilities'). Nor can we see parking as infrastructure serving the area (like streets or bus stops). Instead, this approach sees parking as a private economic good, the demand and supply of which should respond to market price signals. More specifically, this mindset sees parking as a real-estate based service, akin to meeting rooms for hire, or hotel rooms, or even food outlets.

Shoup was not the first to propose this kind of thing. A similar vision of urban parking arrangements has been suggested by various people since 1925 but until Shoup's advocacy these writings had no impact on policy in practice (Barter, 2010).

Nevertheless, we do find something akin to Responsive parking arrangements in the real world. Examples can be found where most parking is public but is provided by the private sector charging market prices, and where on-street parking is tightly regulated, so that the on-street parking doesn't undermine the market in off-street parking. These conditions apply in central business districts (CBDs) in many cities.

They also apply in Japanese cities as a result of several longstanding policies. Spillover is not feared, since there is almost no on-street parking in Japan and overnight parking in the streets is mostly banned. The 'proof-of-parking' law requires anyone wanting to register a car to prove to local police that they own or lease a long-term parking spot near home. This prompted commercial parking in most neighbourhoods. Japan did adopt parking minimums but faced no pressure to increase them as car ownership rose. The parking minimums remain exceptionally low and exempt small and medium buildings (Barter, 2011). Hence, much parking in Japanese cities is commercial with supply and prices that depend on market conditions more than planning.

In their explicit parking policies, neither western CBDs nor Japanese cities have fully embraced a mindset shift towards a Responsive approach. Nevertheless, parking actors in such places do seem to see parking as a real-estate based service.

ADAPTIVE PARKING

Adaptive Parking is a new parking reform framework. It applies a Responsive parking mindset and aims to make parking supply and parking behaviour less rigid and more responsive to the local, ever-changing context.

It is partially inspired by the parking reform ideas of UCLA's Donald Shoup (2005) and involves a broadly 'Shoupista' line of thinking. However, it expands beyond Shoup's proposals and adapts them to a wider set of international contexts.

A jurisdiction that embraces Adaptive Parking would not immediately scrap its existing parking policies. Rather, it would adopt a simple set of five action principles (presented below) as pointers to guide a step-by-step reform process. These reform thrusts are designed to work together in synergy.

Adaptive Parking provides a 'compass' not a blueprint. Specific steps will vary from place to place according to local circumstances. Furthermore, it need not be all-or-nothing. Adaptive Parking reforms can involve small or large steps towards responsiveness.

Other prominent parking reform agendas emphasise planned change and neglect the fostering of market-responsiveness. However, such planning-oriented approaches (most of which fall into the category that I term 'Parking Management') are often compatible with Adaptive Parking and may also benefit from adding a dose of its responsiveness efforts. So hybrid Parking Management/Responsive approaches should be possible.

Here, in brief are the five action principles for working towards more Adaptive Parking.

1: Share!

Encourage more parking to be shared or, even better, made open to the public.

2: Price!

Use prices to eliminate parking queues, including slow motion queues (such as waiting lists) and invisible queues (such as parking search traffic or 'cruising for parking'). This is best done with 'performance pricing' - enabling prices to vary in time and space according to local demand pressure.

3: Sweeten!

Hear the interests and fears of key local stakeholders (such as residents and businesses) over parking reform and, if necessary, 'sweeten the deal'. But do so in ways that enhance responsiveness and that avoid undermining the wider reforms.

4: Relax!

Relax about supply (easing or abolishing minimum parking requirements) and allow parking supply decisions to be more responsive to market conditions. This becomes possible in conjunction with the other reform principles, which should allow governments and local stakeholders to no longer fear spillover parking.

5. Choice!

Market responsiveness sometimes needs further policy effort to expand options,

avoid monopoly problems and reduce rigidities in parking behaviour.

Next I will explain these reform thrusts and show how they work together.

Share! (make most parking shared or open to the public)

The Share! reform principle calls on local governments to encourage parking to be shared or to be made completely open to the public. This is the first of three reform directions that aim to defuse the fear of spillover. The others are Price! and Sweeten!

The Conventional approach results in mostly private parking. Spillover parking is feared because private parking and poorly managed on-street parking mean that parking spillover has nowhere to go without causing problems. This also creates ridiculous expectations. Someone who drives to a shopping district for several errands, parking on-site at the first, would be expected to move the car to each subsequent site or risk angering the first shop's owners for free-riding on their parking.

In areas with a mix of land uses where many destinations have complementary times of peak parking demand, peak parking demand is much less than the sum of each building's peak demand. So public parking is much more efficient than multiple private parking facilities, just as shared seating in a food court is more efficient than having designated tables for each separate outlet.

Encouraging public parking also stimulates efficient pricing practices. This is because Adaptive Parking would discourage the Conventional response to on-site parking saturation or free riders, which is to step up efforts to exclude unwanted users. So owners of parking will need another response to prevent full parking lots. The response encouraged by Adaptive Parking thinking is to charge an appropriate price.

Even in areas that have some public, market-priced parking, encouraging private parking to become public should deepen local market processes, making them more resilient.

Action on this reform principle requires incentives for private parking to be opened to the public and disincentives against keeping it private. Some such policies are already found in some cities. We need not force all private parking to be made public, since some actors may place a high value on having private parking.

Price! (price to prevent queues and cruising for parking)

This reform thrust urges a preference for pricing over other rationing methods to reduce the parking saturation that results in queuing. In particular, it urges that price setting practice be specifically aimed at this goal. This principle is a generalised version of Shoup's suggestion of performance pricing for on-street parking.

Parking 'queues' take several forms. There are obvious queues outside full parking lots but the invisible queues for on-street parking that take the form of parking search traffic (or 'cruising for parking') are much more common and just as disruptive. At places and

times with saturated on-street parking an alarming percentage of traffic can consist of motorists searching for a local parking spot. Waiting lists for regular or season parking, are slow motion invisible queues.

Using pricing to ease parking saturation (and hence parking queues) requires 'performance pricing' or market-responsive pricing. This means enabling prices to vary in time and place (at least to some extent) according to local demand pressure.

There are two key reasons to adopt responsive pricing from the Adaptive Parking perspective. Reducing the disruption caused by queuing (both visible and invisible) by preventing full parking is one reason, as mentioned above. Responsive pricing spreads out demand in both time and space. At the busiest times/places, which are now more expensive, parking durations drop and some motorists seek cheaper locations nearby or quieter times to visit. Some short trips switch to walking or cycling, some longer ones switch to other alternatives, including simply sharing a vehicle.

The other important reason is to support responsiveness in the wider parking system. Responsive pricing does this more strongly than flat prices and much more than other rationing strategies (such as time limits). Such pricing for on-street parking should improve the incentives in the off-street parking 'ecosystem' both to price efficiently and to supply parking at efficient levels. It may even prompt greater efficiency in commercial parking pricing. Commercial parking operations often already have occupancy targets as part of their pricing practices. But even private sector prices can be unresponsive – a parking industry adage says many set prices by 'looking across the street'. Responsiveness as a goal is also why Adaptive Parking urges responsive pricing to clear waiting lists, even though they don't cause obvious negative externalities in the streets.

Discussion of performance pricing often emphasises fears of price rises at busy times and places. But responsive pricing also helps avoid over-pricing at quiet times and places. This should allay fears that pricing will harm local businesses. Such fears are often based on prior experience with pricing that does not vary according to demand. Such flat prices are indeed inevitably too high during less busy times and on less busy streets.

San Francisco has been trialling an ambitious version of responsive pricing, SFPark, which applies to both on-street and public-sector off-street parking in several districts. SFPark prices vary from block to block and between morning, early afternoon and late afternoon. Price adjustments based on occupancy are made every six weeks. An evaluation suggests great promise as well as possible improvements (Pierce and Shoup, 2013). Los Angeles and Washington, DC has started smaller trials.

In fact, many cities have long applied (without much fanfare) a simpler and coarser version of this approach. Even imperfect versions of performance-pricing should be better than none. Examples are numerous and include Amsterdam, Budapest, several London boroughs, and recently Seattle. Relatively small price zones are common, with their prices set primarily using occupancy targeting. Much less common is varying prices between time periods as SFPark does.

Demand-responsive pricing is potentially controversial, especially where it replaces free parking, but there is no getting away from its importance. Easing the political obstacles to such reforms is an aim of the next reform principle, Sweeten!

Sweeten! (make stakeholders happy)

This Adaptive Parking reform direction is a pragmatic but essential one. It aims to give local stakeholders reasons to like the reforms and less reason to fear them. People often feel territorial about parking in "their" streets and we will often need to placate those feelings. Certain groups also fear the loss of special parking privileges.

Resistance to parking reform is also often based on fears of spillover nuisance. Several Adaptive Parking reforms aim to alleviate this but may not be enough in many cases. Locals opposed to change tend to feel more strongly about it than anyone else. So this reform direction aims to defuse the ‘collective action problems’ around parking reform.

Introducing pricing tends to be more difficult than adjusting the prices or changing the price-setting approach. For example, San Francisco has faced stout opposition to parking meters for new areas but little opposition to SFPark’s performance-pricing in areas that already had on-street parking pricing (Barter, 2012).

A promising formula is to be very generous in keeping parking revenues very local and in spending them in ways that please the local stakeholders. This could even involve local property tax rebates using parking revenues.

This reform thrust is another generalisation and expansion of one of Donald Shoup’s proposals. His specific suggestion was to set up local Parking Benefit Districts (inspired by Business Improvement Districts) so that parking revenues are spent in ways favoured by local stakeholders.

It is very important that ‘sweetening of the deal’ does not undermine the spirit of the reform. Ideally, any ‘sweetening’ should actually enhance responsiveness of the local parking system. So compromises around performance pricing should not be about the price-setting approach itself but could focus on the use of the revenues for example. For example, it would be better for residents to be placated by a heavy discount on permits rather than making residents’ permits exempt from responsive pricing altogether. Residents’ usually desire that on-street parking near their homes be available to them at all times (especially evenings and weekends). For the sake of responsiveness, this desire would be better met via performance pricing, not by reserving spaces. Excluding buildings built after the reform from eligibility for permits may be a necessary compromise in some places which should not undermine responsiveness.

Relax! (about supply)

A Responsive parking system would enable responsive parking supply, not just responsive prices. This becomes possible in synergy with the other Adaptive Parking

reform thrusts, which ease (and eventually abolish) the fear spillover parking. Governments can then worry more about parking design than about shortages. The level of supply becomes a matter for well-informed private decisions and market processes, in an adaptive, responsive parking ecosystem.

Relaxing about supply primarily involves easing or abolishing minimum parking requirements. But it can also means moving away from other policies that artificially promote parking supply, such as subsidies and incentives for parking, including the common practice of exempting parking from counting towards the floor area limits under zoning or building codes. This reform principle is again a more general version of one of Shoup's three suggestions - to abolish minimum parking requirements. Remember also that it provides a compass direction, not an ideal end point. Even small steps towards relaxing about supply may be consistent with this Adaptive Parking reform thrust.

The arguments for this principle echo Shoup's arguments for abolishing parking minimums (Shoup, 2005). Once on-street parking is well managed and there is no possibility of free-riding, developers will be able to judge for themselves the parking their developments need, especially if their choices are informed by responsive price signals.

Please note that this reform principle does not actively discourage new parking supply! It is not as radical as it may sound to anyone steeped in the Conventional approach. Abolition of parking requirements does not mean no parking gets built. Numerous city centres across North America, Australasia and Europe have no parking minimums but see few new buildings with zero parking. The whole of Berlin has managed without parking minimums since the 1990s. London, and indeed most cities in England, abolished parking minimums in the mid-2000s (Barter, 2013).

Relax! reforms merely aim to allow parking supply choices to be responsive to local market conditions. Under Adaptive Parking, private real-estate decisions over parking supply are enabled to take account of the relative costs and returns of parking, and of alternative investment opportunities and alternative uses of the space.

There is a widespread belief that reform of minimum parking requirements requires excellent public transport. But this misunderstands the proposal. Eliminating parking minimums does not force parking closures and low-parking development. It merely allows them, if market conditions are favourable. In locations with poor alternatives to driving, developers will continue to see the market need to supply quite plentiful parking.

Choice! (improve options, encourage active choices and ensure competition)

The previous two reform thrusts emphasised choice and responsiveness on the supply side of parking - over prices and over the quantity of supply. This reform principle emphasises responsive demand. Healthy and responsive market processes require that customers are able and willing to exercise choice. There are several elements to this.

One element is the need to preserve consumer choice by averting monopoly problems. Governments don't (usually) control private sector parking prices. So, unless the Adaptive

Parking includes steps against monopoly or market power, it may be vulnerable to cries of 'gouging!', 'exploitation!', 'abuse of monopoly!'. Parking is a local matter so monopoly problems are also local. Actively applying competition policy to parking should guard against localized monopoly (Barter, 2010). This goal is also assisted by the Share! and Price! agendas.

A second element of responsive demand is encouraging active choice making by motorists. This includes enhancing information on parking options (and other choices). Parking guidance including via parking apps is improving rapidly. It also means avoiding pricing practices that create rigidities in parking behaviour (such as habitual parking choices, driving without considering alternatives, and even vehicle ownership). For example, habitual parking behaviour is encouraged by long-term pricing schemes, such as monthly, which are common at workplaces. Pricing practice should aim to make it possible to save money by not driving, by not parking and/or by not owning a vehicle.

The third element of the Choice! push for responsive demand is to enhance and expand options and alternatives to parking. Enhanced taxi services, public transport, walkability and cycling facilities are all helpful. Enhanced options should also ease worries about local parking monopolies. Please note that a paucity of non-driving options does not make Adaptive Parking irrelevant. Enhancing options improves responsiveness but a lack of options does not totally undermine responsiveness. There are almost always some options, even if they are only alternative parking options. Nevertheless, improving options is certainly politically important to the success of parking reform.

CONCLUSION

I have argued that local governments with the inefficient Conventional approach should recognize its failings and seek alternatives.

Such places first need to boost the capacity and willingness to manage on-street parking. This opens up wider parking policy choices, enabling a switch to one of the much more efficient alternative approaches to parking policy, either Parking Management or a Responsive approach.

Adaptive Parking was presented as a promising parking policy reform agenda with a ‘Responsive’ mindset. It urges local governments to adopt five reform thrusts which work together to make local parking arrangements more responsive to local context and to changing market conditions.

Adaptive Parking, together with improved on-street management, offers a possible pathway away from the Conventional approach.

But even places that already apply Parking Management thinking should consider complementing it with Adaptive Parking, since the goal of responsiveness is compatible with many goals pursued under Parking Management thinking.

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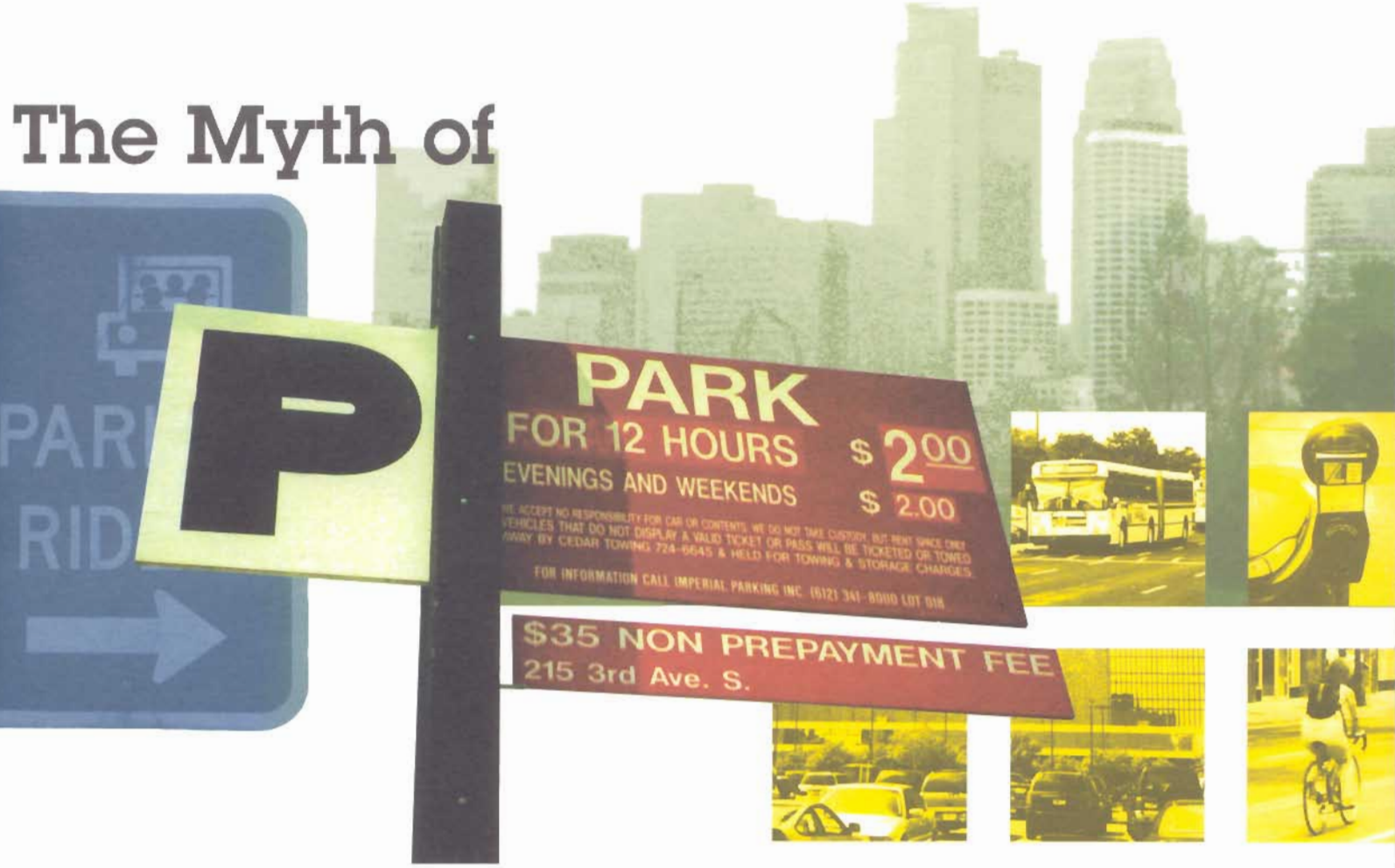
The Myth of



Free Parking

Transit for Livable Communities

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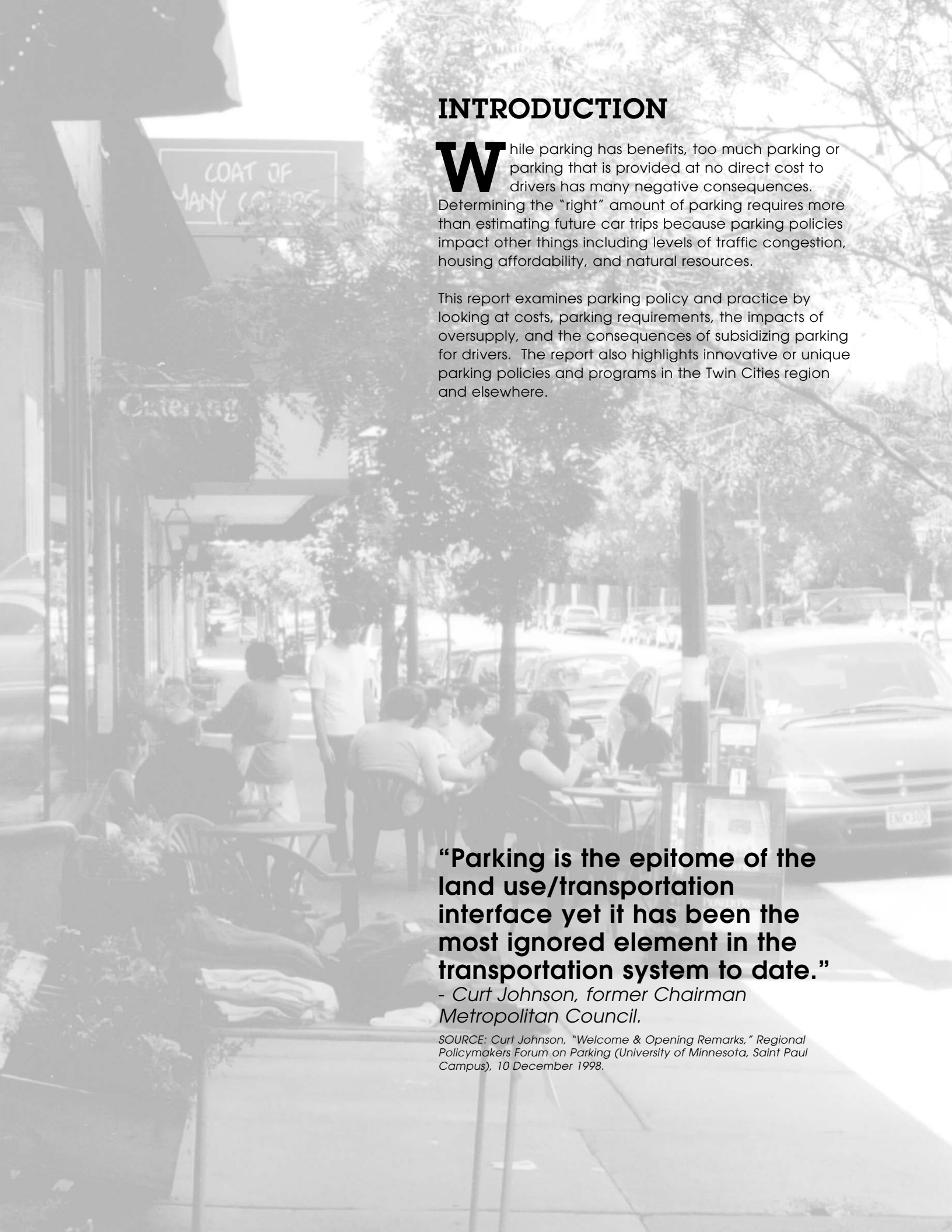


INTRODUCTION

While parking has benefits, too much parking or parking that is provided at no direct cost to drivers has many negative consequences. Determining the "right" amount of parking requires more than estimating future car trips because parking policies impact other things including levels of traffic congestion, housing affordability, and natural resources.

This report examines parking policy and practice by looking at costs, parking requirements, the impacts of oversupply, and the consequences of subsidizing parking for drivers. The report also highlights innovative or unique parking policies and programs in the Twin Cities region and elsewhere.

"Parking is the epitome of the land use/transportation interface yet it has been the most ignored element in the transportation system to date."
- Curt Johnson, former Chairman Metropolitan Council.

SOURCE: Curt Johnson, "Welcome & Opening Remarks," Regional Policymakers Forum on Parking (University of Minnesota, Saint Paul Campus), 10 December 1998.

EXECUTIVE SUMMARY

In the Twin Cities region, drivers rarely think about parking; parking spaces are abundant at all but a few locations and most appear to be free. Public officials typically focus on ensuring "enough" parking to satisfy demand and ignore the problems of oversupply and subsidization. Even most employers fail to question the long-standing practice of providing employees and customers with "free" parking.

The full costs of parking

While vehicle parking provides benefits, those benefits come at a cost - a cost that is often higher than people realize. The cost to construct a single parking stall in a typical above ground ramp is $15,000, and the maintenance costs are hundreds of dollars per year.[1] In the Twin Cities metropolitan region, more money is invested annually in parking and driveways by government, individuals, and businesses than is invested in streets and roads. Furthermore, government's investment in public transit in the Twin Cities metropolitan region is less than government investment in parking.[2]

In the Twin cities region, government invests more money each year in off-street parking and driveways than in public transit.

Parking also has hidden costs and unexpected consequences, especially when it is oversupplied or provided at no cost to the user. Parking plays a key role in the low density development patterns and high dependence on the automobile in the Twin Cities region. "Free" and abundant parking contributes to growing congestion by providing an incentive for driving alone and a disincentive to use other forms of transportation. Too much parking can detract from a "community feel" and pedestrian environment in neighborhoods and business districts. Parking also affects housing affordability by increasing construction costs. In addition, too much parking negatively impacts water quality and urban temperatures.

A proactive approach

Recognizing these problems, some public agencies, municipalities and employers are taking a new approach to parking policy. Some employers are charging employees for parking and are providing incentives for other modes of travel. Public sector leadership is coming from Oregon where the state legislature requires metropolitan areas to reduce parking spaces per capita[3] and the regional government for the Portland metropolitan area placed region-wide limits on the amount of parking municipalities can require.[4]

Other cities are using strategies to reduce the need for parking and better balance supply and demand. Iowa City, Iowa and St. Paul, Minnesota have established special "traditional neighborhood" zoning districts with reduced parking requirements that encourage walkable, transit-oriented development.[5] The City of Seattle provides technical assistance to neighborhoods on parking management. Many cities, including Minneapolis, require employers to implement plans to reduce drive-alone trips by employees.[6] The City of San Francisco uses a parking tax to fund a significant portion of the budget for MUNI, the city's public transit agency.

Recommendations for reforming parking policies and practices

In the Twin Cities region, employers, government agencies, and local units of government all have a role to play in reforming parking policies and practices. This report recommends a number of different strategies; the primary ones are described here.

"Parking is important where the place isn't important. In a place like Faneuil Hall in Boston it's amazing how far people are willing to walk. In a dull place, you want a parking space right in front of where you're going."

- Fred Kent, president of Partners for Public Spaces in New York City.

SOURCE: Fred Kent, in Lisa Wormser, "Don't Even Think of Parking Here," Planning, June 1997, 14.

The Lake Harriet Bandshell in Minneapolis attracts large crowds for summer concerts despite having relatively little on-site parking.

Employers and businesses

"Free" parking is a significant factor in commute decisions because it results in a subsidy for driving. Employers should charge employees and customers for parking, or at a minimum, provide equal incentives for use of transit, carpooling, biking, walking and other modes of travel.

Local government

Municipalities should evaluate local parking requirements to ensure that they are accurate and consistent with goals for housing, transit ridership, density, pedestrian access, and environmental protection. Parking charges at municipal parking facilities and meters should reflect the full costs of providing the parking. In addition, municipalities can work with neighborhoods and businesses to ensure that the existing supply of parking is managed effectively. Tools such as setting a parking cap, taxing parking usage, or charging fees in lieu of parking should be considered.

Metropolitan Council

Regional strategies are crucial to adequately address the negative consequences of parking that is oversupplied or subsidized. The Metropolitan Council should address parking policy more fully in its regional planning and transportation documents. It should consider establishing region-wide minimum and maximum parking ratios and set a goal for reducing parking spaces per capita. Modeling for major transportation projects should examine the effect of employers charging for parking or increasing parking charges as a method to reducing drive-alone commuting and traffic congestion.

The Minnesota Department of Transportation (MnDOT)

Planning documents should recognize the important role that "free" and abundant parking plays in rising levels of traffic congestion and low rates of transit use and carpooling. MnDOT should also provide technical assistance to local units of government on parking surveys, parking management, and other best practices.

State of Minnesota Legislature

The legislature should adopt legislation that establishes a goal for reducing parking spaces per capita. It should direct state and regional agencies to adopt policies to reduce the need for parking and better manage supply and demand. The legislature should increase funding for public transit and evaluate transit fares in light of the availability of "free" and subsidized parking. Finally, the legislature should require all state employees to pay the full cost of parking or provide an equivalent benefit for carpooling, transit use, walking, biking, and other modes.

THE SUPPLY AND DIRECT COST OF PARKING

Parking shapes American cities
Parking is a relatively recent contributor to the way that cities look and function. Until the middle of the 19th century, all cities were designed and built for walking. The central parts of all older American cities were once "walking cities."[7] For the next one hundred years in Europe and North America, the dominant city form was the transit city, with trams and trains connecting walkable urban and rural city centers.[8]

After the Second World War, things began to change. A massive federal program funded the construction of the interstate highway system and another subsidized single family homeownership. Rising incomes encouraged higher levels of auto ownership. People began to move out of central cities into newly developing suburbs. New zoning ordinances changed development patterns by separating land uses and reducing densities.

New suburban communities were less conducive to walking, biking, and cost-effective public transit. As a result, people began to drive for virtually all of their trips, and off-street parking became a large component of the city and suburban landscape.

Central Avenue in Minneapolis c.a. 1935. The Twin Cities once had an extensive streetcar system that shaped development patterns in older communities. Photo courtesy of MN Historical Society

Balancing benefits and costs
In auto-dominated regions like the Twin Cities, parking provides vehicle access to work, shopping, and essential services. It makes driving trips convenient and it is also necessary for goods delivery. Adequate amounts of off-street parking prevent illegal parking on streets or other properties, which can result in traffic hazards, increased congestion, and spillover into residential neighborhoods. While parking has benefits, it also has costs – both obvious and direct costs and other subsidized and hidden costs. The direct costs of parking are discussed in this section.

Parking is often oversupplied
A number of studies have looked at the utilization rates of parking facilities and found that there is often more parking than is needed.

- John Shaw at the University of Iowa studied parking requirements for commercial, office, and residential land uses in the Midwest and found that parking supply exceeded local demand by 16 to 63 percent – with retail having the lowest discrepancy and multifamily housing the highest.[9]

- A 1992 study of parking at suburban office sites in southern California revealed that almost twice as much parking was provided as was actually used.[10]

- In 2000, the City of Seattle conducted a parking study in 26 neighborhoods and found that the majority of neighborhoods used between 40 to 70 percent of their parking supply on average.[11] Only a few areas (four of the 26) used their parking to "full occupancy" standards of 80 to 85 percent.[12]

Parking is expensive to construct and maintain
The direct costs of parking include construction, operation, maintenance, and land costs. Other less apparent yet substantial costs include lost economic development opportunity and environmental impacts, which are discussed on pages 9-12.

According to Minneapolis planners, the average cost to build one parking space in that city in a surface parking lot is $3,000, one parking space in an above ground ramp is $15,000, and in an underground garage is $27,000.[13] Construction costs from recent projects in St. Paul are slightly less than the estimates for Minneapolis.
The figures in Table 1 are for construction costs only; parking operation and maintenance such as snow removal, management, and property taxes

The cost to construct and maintain parking is typically not paid directly by the user. Here are a few examples of how the cost is hidden:

• A software company provides its employees with "free" parking in an attached ramp. The cost of leasing space in the ramp is included with the office rent and increases the cost of the products sold. Employees who ride the bus or walk to work receive no benefit from the "free" parking.

• A grocery store chain provides abundant "free" parking for its employees and customers. The parking lot and its maintenance are simply treated as a cost of doing business and are paid for by raising the price of everything from pickles to toothpaste. Customers who walk or bike to the store also pay for the parking.

• Almost all cities, including St. Paul and Minneapolis, provide some level of "free" on-street parking. The capital and maintenance costs of on-street parking stalls are paid for with local property taxes without adjustment for actual usage. The family with no car will likely pay the same in taxes as the family with three cars.

for privately owned facilities add to the cost. According to the International Parking Institute, it costs about $650 per year to operate and maintain each stall in structured parking.[14] Loop Parking Company, a Twin Cities firm, estimates the annual cost as $1,000 per stall.[15]

Everyone pays for parking indirectly

With the exception of central business districts, airports, and major institutions like hospitals and universities, parking is nearly always "free" to the user. Respondents to the 1990 Nationwide Personal Transportation Survey reported "free" parking for 99 percent of their auto trips[16]; in the 1995 version of the survey, 94 percent of commuters said they received "free" parking at work.[17] A 1999 study of parking subsidies in downtown Minneapolis and Saint Paul found that parking subsidies were substantial, although below national averages: 32 percent of downtown Minneapolis employers and 44 percent of downtown St. Paul employers provide some level of parking subsidy.[18]

Government, employers, retailers, and others typically assume the financial costs of developing and maintaining on-street parking, parking lots, and garages. According to a study by the Center for Transportation Studies at the University of Minnesota, governments in the Twin Cities region spent approximately $270 million on off-street parking and driveways in 1998, which is more than the total amount they invested in transit.[19] In the same year, business and individuals invested approximately $2 billion in parking and driveways.[20] Government, businesses and institutions together invested more in parking and driveways than was invested in streets and highways in 1998.[21]

When government and business spend money for parking, they are using revenues derived from taxes or the increased cost of goods and services. This means everyone pays for parking as citizens and consumers, regardless of whether or how much they use it. While the cost of parking represents an enormous public and private investment, it receives almost no public scrutiny.

Table 1: Sample construction costs of St. Paul parking projects

Project	Construction Cost	Number of Spaces	Cost per Space
Essex on the Park underground parking associated with housing (2001)	$2.4 million	156 (underground garage)	$15,000
St. Paul Port Authority Capital City Plaza Parking Garage (2001)	$20 million	990 (above-ground garage)	$20,200
City of St. Paul surface lot for Conseco Finance (2000)	$3 million	950 (surface lot)	$3,150

SOURCE: Saint Paul Port Authority, "June 30, 2001 Newsletter," 17 October 2001, <http://www.sppa.com/newsaug01.htm> (6 November 2001); Karl J. Karlson, "Downtown Revival: Pieces Coming Together," Saint Paul Pioneer Press, 3 May 2000, 10A.

HIDDEN COSTS AND NEGATIVE EFFECTS OF PARKING

The costs to build and maintain parking lots, ramps, and garages are direct costs and are fairly easy to measure, but parking imposes other less obvious costs. When parking is subsidized and when it is oversupplied it has many negative consequences. Many of these consequences impose costs on individuals or society as a whole. For example, when parking is provided to employees at no charge there is a higher rate of driving alone, which contributes to traffic congestion. This is a hidden cost. When parking is oversupplied it adds to the costs of housing, which reduces its affordability. Seven major consequences of oversupplying and subsidizing parking are described in this section.

With fewer parking subsidies, more people tend to ride transit, carpool, bike or walk.

"Free parking is an invitation to drive to work alone."
– Donald Shoup, national parking expert and Professor of Urban Planning, University of California at Los Angeles.

SOURCE: Donald C. Shoup, "An Opportunity to Reduce Minimum Parking Requirements," Journal of the American Planning Association 61, no. 1 (winter 1995): 15.

"Free" or abundant parking discourages transit use, carpooling, and other alternatives to driving

Parking that is abundant and "free" to the user discourages drivers from using other forms of transportation. Several studies show that when parking subsidies are removed, there is an increased use of commuter alternatives. A study involving seven employers in Minneapolis and St. Paul showed an 11 percent reduction in solo driving and a 47 percent increase in bus ridership when employees were offered a free or reduced price bus pass in lieu of free or reduced-price parking.[22] Another study showed an average decrease in solo driving of 25 percent when employees were charged for parking.[23]

Table 2 highlights the role parking charges play in the transportation mode used by Twin Cities area commuters. As the table shows, even in downtown Minneapolis, which has the most extensive and convenient bus service in the Twin Cities metro area, bus ridership is minimal when employers provide "free" parking to employees and no comparable benefit for other modes. Where employees are charged for parking, bus ridership rises to 40 percent of commuter trips. In addition, when Minneapolis employers both charge for parking and offer a transit benefit, bus ridership rises to 50 percent and driving alone declines to under 30 percent.

Excessive parking requirements reduce housing affordability

Parking requirements that are set too high drive up the cost of housing, and affect the cost of affordable housing disproportionately. One study found that parking requirements increased development costs for affordable housing by 12 percent when one parking stall is required and by 25 percent when two stalls are required.[24] Parking

requirements for affordable housing are often the same as for market-rate housing, even though low income families usually own fewer cars than middle class families.[25]

East Village in downtown Minneapolis. High parking requirements increase the cost of affordable housing.

Policymakers and local developers believe that parking requirements can be especially burdensome when affordable housing projects are "infill" development, i.e., built on vacant or blighted parcels in older developed cities. Consequently, the cost to develop required parking can be a significant development cost and can reduce the incentive to build affordable housing.[26]

A study conducted in San Francisco, California, found that the sale price of typical single family homes that included off street parking were 11 to 13 percent higher than the same housing without parking.[27] The price differential meant that 24 percent more households could qualify to own the typical homes that did not include parking.[28] Therefore, because most housing incorporates the cost of parking, many people are excluded from home ownership because of parking they may not even need. The authors conclude by suggesting that the public interest would be better served if the costs of housing and parking were separated, and people could choose whether to purchase parking.[29]

High parking requirements can slow the redevelopment of older properties, such as the Specialty Building on University Avenue in Saint Paul.

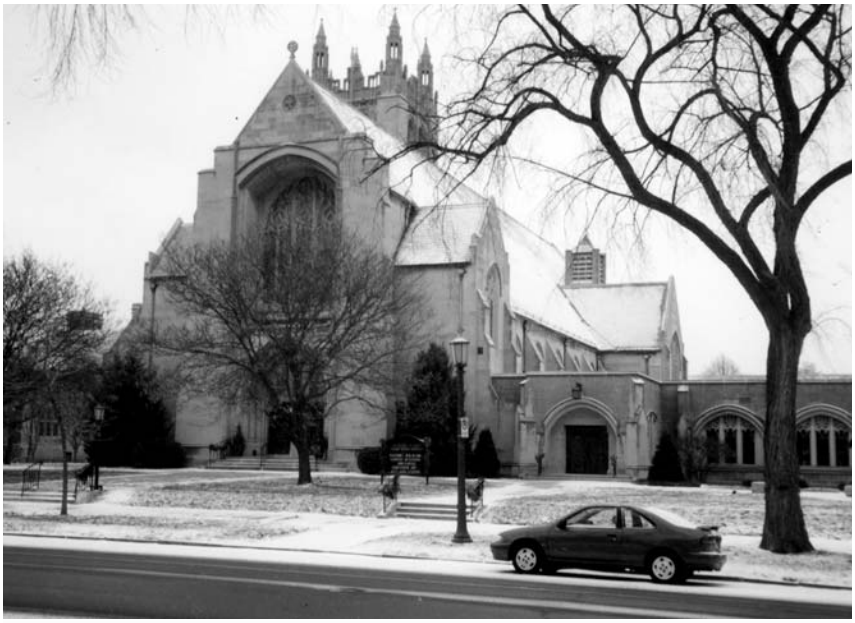
Table 2: Travel Mode Split and Parking Charges for Twin Cities Area Commuters

	Minneapolis Central Business District	Minneapolis with employer-provided parking	Minneapolis with generous employer-provided transit benefit	St. Paul Central Business District	Twin Cities Suburbs
Average Monthly Parking Cost to User	$175	"free"	$125	$114	"free"
Percent Bus Use	40%	5%	50+%	14%	2-3%
Percent Driving Alone(1)	40%	90+%	<30%	60%	90+%

SOURCE: Downtown Minneapolis Transportation Management Organization, St. Paul Transportation Management Organization, and Metropolitan Council staff. (1) Single Occupancy Vehicle

Excessive parking increases development costs, displaces potential economic development, and discourages redevelopment

When more off-street parking is provided than is used, development costs rise unnecessarily. More land must be purchased and additional parking must be figured into construction costs. An oversupply of parking also displaces potential economic development by occupying land that could be used for more productive or higher amenity uses.



Church parking lot in St. Paul. In Minnesota, churches do not pay property tax on their parking lots and most lots sit empty for most of the week. St. Paul requires churches to provide one parking stall for each 6 feet of pew space or one stall for every three seats.

Private parking does produce tax revenue for cities. Municipally-owned parking can produce net income (revenue minus expenses) for cities when parking charges are high enough to cover capital and operating costs. However, these benefits must be weighed against both the lost tax revenue of more valuable economic development and the lost opportunity to encourage greater transit ridership and to create more pedestrian-friendly areas.

In many older communities where individual sites or buildings await revitalization, redevelopment efforts can be hampered by excessive parking requirements. This was the case at the Specialty Building in St. Paul. Developers and the community had hoped to restore the old building as four floors of office space, but a shortage of parking with which to meet the city's minimum parking standards forced some floors to be used as storage.[30] Location of the property on one of the region's busiest bus routes did not alter the parking minimums.[31] The St. Paul Housing and Redevelopment Authority has since facilitated the purchase of a nearby lot that will be developed for the additional parking that is needed to meet the parking requirements for the building.[32]

Excessive parking reduces tax revenues

Land used for parking is typically taxed at a lower rate than land used for other commercial or residential uses. Government and church parking is not taxed at all. When parking minimums are set too high, or when developers build parking above minimum requirements, property tax revenues are lost unnecessarily. Even when cities are deriving revenue from municipally-owned parking, or building more parking out of a perceived need to retain business downtown, there are lost opportunity costs to consider.

The Minneapolis Planning Office is proposing that transit use be increased by 10 percent in the downtown area by 2010.[33] If this goal is achieved, Minneapolis would avoid the addition of three full blocks of parking ramps in or near downtown, or six large ramps.[34] Assuming the ramps would have been municipally owned, for every dollar that the City would have received in revenue from those parking ramps, the City would instead receive three dollars in tax revenue if the same three blocks were privately developed.[35]

Excessive parking encourages sprawl development

Because parking tends to be land-intensive, excessive parking requirements favor outlying suburban locations where land costs are lower and larger tracts of land are available. When excessive parking requirements hinder redevelopment in older areas, parcels remain vacant near the urban core, and previously undeveloped land—including productive farmland—is developed for commercial or residential use plus parking. Such practices

contribute to low-density development and lead to urban sprawl.[36] Urban sprawl consumes more land than is needed for development, encourages encroachment on environmentally sensitive areas, and increases infrastructure costs for such needs as transportation and sewers.

Parking harms the environment

Runoff from the impervious surfaces of parking lots and garages damages rivers and streams. The run-off enters water bodies at high volume, at higher temperature, and at greater velocity than when it naturally percolates into the soil, causing increased erosion, straightening of stream channels, loss of streamside habitat, and sedimentation.[37] In addition, runoff contains pollutants such as heavy metals, oils, gasoline, and radiator fluids, which harm aquatic life. Of "non-point" pollution sources (sources which are not traceable to a single source, such as a factory or sewage treatment plant), urban sources such as roads and parking lots follow agricultural sources as the largest contributor to impaired waterways.[38]

Recent research also indicates that paved surfaces such as roads and parking lots contribute to a phenomenon called the urban heat island effect. Urban areas have been found to be 2-8 degrees Fahrenheit hotter in summer due to increased solar gain from dark-colored roads, parking lots, and building roofs.[39] This increases energy demand, smog and human discomfort.[40]

By encouraging drive-alone trips, abundant, subsidized or "free" parking indirectly contributes to smog and greenhouse gas emissions.

Excessive or poorly designed parking results in unappealing streetscapes and less walkable developments

While abundant parking is seen as a necessity by most drivers, few people find typical parking lots or parking ramps to be attractive components of the urban or suburban landscape. Nonetheless, as society has become more auto dependent, parking has factored more visibly into development, often with unattractive and obstructive results. As described in the City of Seattle's Transportation Strategic Plan:

> The location and design of parking has a major impact on the pedestrian environment. Siting parking in front of buildings disconnects the public street and sidewalk system from building entrances, creating an unattractive and potentially unsafe building access for pedestrians. Large open lots make for a discouraging and unpleasant streetscape. The blank walls of parking garages make streets particularly pedestrian-unfriendly.[41]

Together with strategies to reduce the amount of parking, efforts can be made to design and locate parking in a way that preserves or enhances the pedestrian environment. These efforts are discussed further on page 25.

In suburban-style shopping areas such as the Midway Marketplace on University Avenue in Saint Paul, shoppers often find it easier and safer to drive from one section of the parking lot to another rather than accomplishing a number of errands on foot.

PARKING POLICY AND PRACTICE – GOVERNMENT AND THE PRIVATE SECTOR

Managing and regulating parking is typically a responsibility of municipal governments. Most cities regulate parking in their local zoning codes or municipal code, and parking requirements often do not match parking needs. Surveys have indicated that parking is often oversupplied. Some local governments build more parking or offer it at below cost in an effort to compete with other cities for jobs and tax base. Lenders and builders operate from industry standards that often result in the construction of more parking than is needed. This section of the report focuses on the role of government and the private sector in parking policy and practice.

Federal tax policy subsidizes parking

The deductibility of parking expenses is a powerful incentive for employers to provide "free" parking to their employees. The Internal Revenue Service treats parking costs for employees and customers as a deductible business expense. Up to $185 per employee can be deducted for parking expenses each month, while only $100 per month can be deducted for employer-provided transit expenses.[42] There is no tax deduction for employers who provide an incentive for employees to bicycle or walk to work.

The federal tax code shows the same bias when it allows employees to pay for parking and transit on a pre-tax basis.[43] However, the IRS does allow employers to "cash out" parking privileges to employees to mitigate the effects of the incentives that favor driving alone over other travel modes.[44] Parking cash out is a strategy whereby employers offer employees the cash equivalent of any parking subsidy the employer normally provides. Employees can then choose to use the cash for alternative modes of travel. See page 26 for a full discussion of parking cash out.

Parking policy at the state and regional level

Some metropolitan regions, including Chicago, Portland, Seattle, San Francisco, and the State of Oregon, make parking a key element in transportation planning. In contrast, parking is almost ignored in state and regional transportation planning documents in Minnesota. The Minnesota Department of Transportation does not mention parking in its 2001 Metropolitan Area Transportation System Plan.

The Metropolitan Council has not taken an active role in parking policy. In 1998, the Council conducted a Policy Makers Forum on parking and recommended a few topics for continued study.[45] These topics included parking cash-out, flexible parking/transit passes, and improved park-and-ride facilities.[46] The results of the study on parking cash-out are described later in this report. A park and ride facility study is being conducted by the Council. Parking is mentioned only briefly in the Metropolitan Council's Transportation Policy Plan (2001).[47]

A former Minnesota law required state employees to pay for parking spaces that the state was leasing on their behalf. This requirement transferred the price of parking from the employer back to individual drivers.[48] The legislature repealed this law in 1997 after state employee unions complained.[49] Another law placed a surcharge on single occupancy vehicle parking in the State Capitol area; proceeds from the surcharge funded commuter vans, transit contracts, and parking lot maintenance, but this law was repealed in 2001 for similar reasons.[50]

The Minnesota Legislature has repealed two progressive laws relating to state employee parking.

On a positive note, ten state agencies in Minnesota that provide their employees with "free" or subsidized parking are now also offering employees the opportunity to purchase a low-cost bus pass.[51] The cost of the bus pass is subsidized by the state agencies and provides agency employees with an incentive to use transit.

Municipal parking requirements

Almost all cities have some type of parking requirements, and the most typical requirement is a parking minimum. The main purpose of parking minimums is to ensure an adequate amount of parking to meet the parking needs of each land use and to avoid negative effects such as spillover traffic onto adjacent properties or neighborhoods.

The parking minimum can be based on the square footage of office space or retail space, the number of seats, or the number of units. Typical minimums are 4 parking spaces per 1,000

square feet of office space, 1 to 2 spaces per residential unit, or 1 space per every 3 restaurant seats plus 1 space per each restaurant employee. Cities also typically have parking lot and ramp design standards such as dimensional requirements, landscaping and buffering, and architectural standards.

Parking requirements are often geared toward meeting the highest possible parking demand. Here, much of the parking lot at Arlington High School in Saint Paul sits empty on a school day.

"Minimum parking requirements are truly drugs for cars. They ought to be a controlled substance (because) they breed car trips."
– Dom Nozzi, Senior Planner for the City of Gainesville, Florida.

SOURCE: Adam Millard-Ball, "Putting on Their Parking Caps," Planning, April 2002, 17.

As several studies have shown, parking requirements often do a poor job of matching parking supply with demand and often result in an oversupply of parking. A key reason is that requirements are often based on national standards that do not reflect local conditions.[52] While national guidebooks advise cities to conduct local surveys and not simply adopt the national standards, cities often fail to follow this advice. The parking handbook published by the Institute of Transportation Engineers (ITE) "cautions that local surveys are the most important tools for determining actual parking needs."[53] Parking requirements are also often borrowed from nearby cities, which can be an inadequate method of determining parking needs.[54]

To make matters worse, parking requirements have traditionally been geared towards meeting the highest possible demand rather than typical use. The problem is further compounded because cities do not have the resources to conduct parking use studies and to update those studies regularly.[55]

Parking requirements generally ignore local factors that can influence the demand for parking. These include pricing of parking, demographics, income levels of the users, land density, and accessibility by transit, biking, and walking.[56] However, some cities are attempting to localize their requirements. St. Louis Park, Minnesota for example allows new developments to reduce the amount of on-site parking to account for some of these factors.[57] See page 21 for more information on St. Louis Park and flexible parking requirements.

As Table 3 illustrates, parking requirements can vary widely from city to city. Chicago, Portland, and Seattle have significantly lower off-street parking requirements for retail and office uses than do either Minneapolis or St. Paul. For most uses, St. Paul has significantly higher parking requirements than Minneapolis. Minneapolis exempts the first 4,000 square feet of most commercial uses from off-street parking requirements, while St. Paul's requirements kick in with new development as small as 225 square feet. St. Paul requires 50 percent more parking for residential uses than Minneapolis. St. Paul's requirements likely contribute to that city's lower density development pattern.

In August 2002, the City of St. Paul conducted a parking utilization study at several shopping centers in the city and discovered average actual usage rates of 31 percent of the available parking during the peak hours of use. The study recommends changing the City's requirements for shopping centers from a minimum of one space per 280 square feet (s.f.) to one space per 500 s.f. and instituting a parking maximum of one space per 350 s.f.

Table 3: Parking requirements in selected cities

	St. Paul (2)	**Minneapolis** (2)	**Chicago**	**Portland** (3)	**Seattle**
Residential Apartment/ Condo	Min. 1.5 spaces per unit	Min. 1 space per unit	Min. 1 space per unit Max. 1.5 spaces per unit or 4 spaces in residential districts (whichever is greater)	Min. 1 space per unit	Min. 1.1 – 1.25 spaces per unit (lower requirements for low income housing)
General Retail	Min. 1 space per 225 sq ft. GFA(1)	Min. 1 space per 300 sq. ft. GFA in excess of 4,000 sq. ft.	Min. 1 space per 500 sq. ft. GFA in excess of 4,000 or 10,000 sq. ft depending on zone	Min. 1 space per 500 sq. ft. GFA Max. 1 space per 200 sq. ft. GFA (3)	Min. 1 space per 350 sq. ft. GFA in excess of 2,500 sq. ft
General Office	Min. 1 space per 350 sq. ft. GFA(1)	Min. 1 space per 300 sq. ft. GFA in excess of 4,000 sq. ft.	Min. 1 space per 400 sq. ft. GFA in excess of 4,000 or 10,000 sq. ft depending on zone	Min. 1 space per 500 sq. ft. GFA Max. 1 space per 300 sq. ft. GFA	Min. 1 space per 1,000 sq. ft. GFA

(1) Gross Floor Area.
(2) St. Paul has no formal parking requirements in the downtown district, and Minneapolis has virtually no parking requirements in its downtown district.
(3) Portland has no minimum parking requirements for general retail in several neighborhood commercial zones

SOURCE: Saint Paul Legislative Code, 2002, ch. 62, sec. 62.103(g); Minneapolis Code of Ordinances, 2002, title 20, ch. 541, article III, sec. 541.180; City of Chicago, "Chicago Zoning," <http://www.ci.chi.il.us/Zoning/ordinance/link7_12.html> (14 May 2002); City of Chicago, "Chicago Zoning," <http://www.ci.chi.il.us/Zoning/ordinance/link8_11.html> (14 May 2002); City of Chicago, "Chicago Zoning," <http://www.ci.chi.il.us/Zoning/ordinance/link9_11.html> (14 May 2002); Portland City Code, 2001, title 33, ch. 33.266, sec. 33.266.110; Seattle Municipal Code, 2002, title 23, ch. 23.54, sec. 23.54.015.

Chicago has low parking requirements, especially in densely developed portions of the city. The city is also served by an extensive public transit system.

Isolated local planning and local competition for economic development encourage the oversupply and underpricing of parking

Because so much of the cost of parking is hidden and because government subsidies have for so long distorted the price of parking, drivers typically expect that parking will be available and that it will be "free." At the same time, few people expect or demand similar subsidies for transit, biking, walking or other modes of travel.

The system of skewed public and private subsidies, in turn, creates an inflated demand for parking that businesses, developers, and local governments are reluctant to challenge. Businesses expect "free" and abundant parking when choosing locations, and developers often insist on providing it. Developers readily build abundant parking, especially retail and office, because they say both potential tenants and potential investors demand it.[58]

> **"We don't charge for parking at our new buildings in suburban locations because it would put employers in our buildings at a disadvantage in attracting employees and make our properties less attractive to tenants."**
> *– Richard M. Collins, Vice President for Office Properties with Ryan Companies US, Inc.*
>
> *SOURCE: Richard M. Collins, remarks in panel discussion, Congestion Solutions Summit: A Public Private Partnership for the Future (Bloomington, Minnesota), 2 May 2002.*

Tenants, such as retail stores and companies with large numbers of employees, want to ensure that there is as much parking as their tenants and customers want, because they assume, often

correctly, that there is no alternative to driving and parking. Investors likewise expect successful projects to include certain minimum levels of parking, and tend to consider projects incorporating such things as shared parking or transit-oriented design as untested and therefore "risky."[59]

Municipal tools to address parking supply and management

Parking maximum: Sets an upper limit on the number of parking spaces permitted in conjunction with individual land uses, such as a restaurant or office complex.

Parking cap: Establishes an upper limit on parking as well, but a cap is applied to all private and public parking on a city-wide or region-wide basis. Caps are another tool to address a potential oversupply of parking.

Shared parking: Two or more entities, such as a business, residential development, or church or synagogue, share parking facilities. Typically entities which have different periods of heavy parking demand would share, such as an office complex and a movie theater.

Travel Demand Management (TDM) plan: Is prepared by an employer or developer and documents how single occupant vehicle trips will be reduced or mitigated. TDM plans typically describe incentives that will be provided or infrastructure changes that will be made to encourage employees or tenants to use transit, carpool, bicycle, or walk to the facility covered by the plan. The most effective TDM plans are mandatory and include penalties for non-compliance.

Cities also compete with each other to provide an abundant parking supply in order to attract businesses and increase their tax base. Cities may subsidize the cost of parking directly or indirectly, through the use of Tax Increment Financing (TIF), land acquisition for parking, or even provision of below cost or free municipal parking. In Minneapolis, structured parking is one component of development that is eligible for the development subsidy that TIF provides.[60] (TIF is a financing tool cities can use to pay for certain components of development including infrastructure, through the future tax revenues anticipated from the development.)[61]

Even cities that do not subsidize parking may be reluctant to limit the amount of private parking. For example, the Minneapolis City Council established a surface parking construction ban downtown, only to have it waived for a large development a couple of years later.[62] This is one argument for regional involvement in parking policy.

Local decision makers – local governments, developers, businesses, employers – are responding to a "market demand" that has been distorted by two significant factors. First is the public subsidy for auto use compared to the alternatives. This often forces people to drive and park because alternatives are scarce. Just as importantly, demand is based on pricing for parking that typically does not reflect the real cost.

Parking will continue to be an important component of development projects, but local governments, developers, businesses and individuals must begin to consider the total costs of parking against the total costs of alternatives. Local governments, who currently have the primary role in the regulation of parking, must take the largest share of responsibility for correcting skewed pricing and the resulting distortion in demand.

Downtown parking: St. Paul and Minneapolis differ

Central city downtown parking is typically managed more intensively than in other locations in a region. Downtown parking often costs the user money (and is therefore priced more accurately), is more likely to be in ramps or underground, and supply may be limited. In most urban downtowns, good transit service and the high cost of parking make driving alone and parking a less attractive alternative.

Minneapolis has parking minimums in the downtown core only for the largest development projects.[63] The City discourages any additional long term (all-day and commuter) parking downtown, and focuses on short-term parking

availability.[64] Minneapolis also requires a Travel Demand Management (TDM) Plan for all new developments larger than 100,000 square feet or for projects the Public Works Department believes will have a significant traffic impact.[65] Particularly outside the downtown core, the City uses TDM plans to achieve a balance of parking and use of other modes.[66]

Downtown parking tends to cost users money, be located in a garage, and be closely managed.

"Successful downtowns have a high density of economic, social, and cultural activities that make them attractive. Abundant 'free' parking, while easing access (in the short run), may destroy the density necessary for a healthy downtown. Furthermore, the additional cars attracted by an increasing parking supply may increase downtown congestion threatening the very access provided by that parking."

- Richard Voith

Source: Richard Voith, "The Downtown Parking Syndrome: Does Curing the Illness Kill the Patient?", Business Review, Jan.-Feb. 1998, 4.

St. Paul does not have formal parking requirements for the downtown core; instead, the City works with individual developers and businesses to try to establish "appropriate" levels of parking.[67] St. Paul does not require a Travel Demand Management plan but encourages developers to work on a voluntary basis with its Transportation Management Organization.[68] Staff at the City of St. Paul argue that because St. Paul is competing with the suburbs for workers and shoppers, and because transit service has not been growing, more parking must be provided downtown.[69]

As Table 4 shows, St. Paul has a higher ratio of parking to downtown workers than Minneapolis. St. Paul has .58 parking spaces per employee downtown, and Minneapolis has .45 spaces per employee. Not surprisingly, in Minneapolis, 40 percent of downtown commuters use transit and 40 percent drive alone, whereas in St. Paul 14 percent use transit and 60 percent drive alone.[70]

St. Paul's greater reliance on single occupancy vehicle use and parking than Minneapolis' may be due in part to inadequate transit funding and service. St. Paul is served by 2,090 bus trips on a typical workday, whereas Minneapolis has 4630 bus trips per day.[71] In other words, St. Paul has only 45 percent of Minneapolis' bus service during weekdays.

Table 4: Estimated Downtown Parking and Jobs

	St. Paul	Minneapolis
Downtown Jobs	50,000	145,000
Off Street Parking Stalls	29,000	66,000 (1)
Number of parking stalls per job	.58	.46
Percent of Parking Municipally Owned	33% (2)	38%

(1) Source: City of Minneapolis Transportation Planning Department, 1999 figures updated to include major parking projects to date.
(2) Source: City of St. Paul Planning and Economic Development Department, current figures. This figure includes parking owned by the City, the Housing and Redevelopment Authority (HRA), the St. Paul Port Authority, and the River Centre ramp.

TOOLS AND STRATEGIES

Many state, regional, and municipal governments and employers are using innovative strategies to reduce the need for parking and to better manage supply and demand. A few cities have completely revised their zoning and parking requirements in an effort to achieve specific environmental, development, or transportation goals. Other cities have taken a proactive strategy towards managing existing parking supply or have raised the cost of parking and increased transit service. Several of the options carry tax advantages for businesses and may increase revenues for cities as well. Some of the more innovative strategies and programs are summarized here.

A. State and Regional Policy

1. Address parking in state and regional plans

Several states and regions consider parking to be an important part of their transportation systems and address parking issues in plans and planning guides.

Oregon:
Oregon has taken a particularly aggressive approach to parking management. The Transportation Planning Rule, an administrative rule promulgated in 1991, requires the state's larger metropolitan areas to achieve a ten percent reduction in the number of parking spaces per capita during a 20-year planning period.[72] The Rule was written to reduce ozone emissions and to respond to the transportation and land use impacts of growth.[73] In addition, the Oregon Department of Transportation (ODOT) can designate Special Transportation Areas along town main streets that are also state highways.[74] In these areas, local access is as important as the movement of through traffic. ODOT also encourages on-street parking and shared parking behind buildings.[75]

Washington:
In 1992 the State of Washington passed the Commute Trip Reduction Law recognizing the negative effects that air pollution and traffic congestion were having on the state's metropolitan areas. The law reads "the capital and environmental costs of fully accommodating the existing and projected automobile traffic on roads and highways are prohibitive. Decreasing demand for vehicle trips is significantly less costly and at least as effective in reducing traffic congestion and its impacts as constructing new transportation facilities such as roads and bridges, to accommodate increased traffic volumes."[76]

The State Legislature directed cities and counties experiencing pollution and congestion to require large employers to develop "commute trip reduction plans" to reduce drive-alone commute trips.[77] The Legislature further required that the plans establish specific percentage reductions in vehicle miles traveled per employee, with a 35 percent reduction goal from the base year of 1992 by 2005.[78] All state agencies were required to enact similar plans.[79] While the law does not specifically address parking, by reducing drive-alone commute trips, demand for parking is also reduced.

California Air Resources Board

www.arb.ca.gov/homepage.htm

California:
In portions of the state that have not reached acceptable standards of air quality, the State of California's Air Resources Board requires employers with over 50 employees who provide subsidized parking to offer a parking cash out program.[80] (Parking cash out is discussed more completely in this section under Employers.) While this law was passed in 1992, it could not be implemented effectively until 1998, when IRS changes were included as part of the Transportation Equity Act for the 21st Century (TEA-21).[81] However, restrictions limit the effectiveness of California's cash out law. For example, "cash out" is not required for employers that own their employee parking spaces, employers who cannot reduce their leased parking without penalty, and employers who cannot separate parking costs from building rent costs in a lease agreement.[82]

Portland, Oregon:
In 1996, Metro, Portland's regional government, established minimum and maximum parking ratios for municipalities and neighborhoods. Metro's Urban Growth Management Functional Plan

Portland, Oregon downtown. All cities in the Portland metropolitan region have parking minimum and maximum requirements. Areas of the region with good transit service must have lower parking requirements.

requires local municipalities to adopt parking ratios that are consistent with regional standards.[83] The standards identify parking requirements for zones within the region. Lower parking ratios are required in areas in the region with frequent transit and good pedestrian access.[84]

Other Regions:
Many other major metropolitan regions in the U.S. make some reference to parking in their regional transportation plans. Most plans recognize parking costs as an important factor in transportation mode choice. Some plans also acknowledge that runoff from surface parking lots impacts water resources.[85] The Puget Sound Regional Council has made parking a key strategy in its efforts to concentrate development in urban centers and at high capacity transit stations.[86] San Francisco's Metropolitan Transportation Commission proposes to study the conversion of "free" parking to pay parking to encourage transit use.[87] The San Diego Association of Governments calls for reducing parking requirements in areas with good transit access and calls on municipalities to consider parking caps and preferential carpool parking.[88]

2. Government can set an example
State and regional government agencies can set an example for private employers by charging employees the fair market value for parking and by providing an incentive for transit use, carpooling, biking, and walking. Currently ten state agencies with employees located in Minneapolis and St. Paul offer their employees a transit pass at a reduced cost.[89]

B. Municipal Government

Municipal governments are most directly responsible for setting and enforcing parking requirements and effectively managing parking supply. There are many tools and strategies municipalities can use to achieve their parking and overall transportation goals, several of which are highlighted in this section.

1. Evaluate and update parking requirements to reflect actual need and align them with transportation, environmental, and land use goals
Cities are using a variety of strategies to reform parking requirements by better aligning the requirements with actual needs and community goals. Some of these strategies are discussed below.

Local surveys: Parking requirements should reflect actual local usage and need, rather than being based solely on national standards or standards from other cities. Experts recommend local surveys of actual parking usage to revise and periodically update requirements. Portland, Oregon and Seattle, Washington are two municipalities that have conducted extensive usage studies to determine appropriate parking requirements for various land uses.[90]

Parking minimums: Municipalities should establish parking minimums that reflect peak usage on average days rather than planning for the busiest days of the year.

Parking maximums: Most cities have traditionally focused only on ensuring that certain parking minimums are met. Parking maximums set an upper limit on the amount of off-street parking

permitted on a site according to the type and size of uses on the site. This allows cities to regulate oversupply of parking as well as to ensure enough parking.

The Cities of Bellevue, Washington,[91] Salt Lake City, Utah,[92] Cambridge, Massachusetts,[93] and municipalities in the Portland, Oregon metropolitan region all have parking maximums.[94] In Cambridge, if a developer wants to build more parking than permitted by the zoning code, the City will reduce the approved size of the development project.[95]

Parking minimums and maximums can be adjusted downwards, or in some cases eliminated altogether in locations with good transit and pedestrian access. Many cities, including St. Paul and Minneapolis, have very few if any parking requirements in their central business districts. The Portland metropolitan region established two different sets of parking minimums and maximums; lower parking requirements apply to areas that have good transit access.[96] Portland also exempted certain densely developed, mixed-use areas from minimum requirements and established parking maximums only.[97]

In some cities, including Minneapolis, bicycle-parking can replace a share of required automobile parking.

Allow flexibility in requirements:
The City of St. Louis Park allows reductions in its typical minimum parking requirements as incentives to accommodate transit and pedestrians and to reduce the amount of on-site parking.[98] See the text box on the next page. In Portland, Oregon, bicycle parking can substitute for up to 25 percent of required auto parking.[99]

Establish special zones for reduced parking through overlay zones or other means:
The City of Minneapolis applies a "Pedestrian Overlay" district to several areas in the city, including the Uptown area in south Minneapolis.[100] (An overlay zoning district applies additional standards to an area while retaining the underlying zoning) In Minneapolis' Pedestrian Overlay District, drive-through facilities and other auto-oriented uses are prohibited, parking may not be located in front of the building, and building facades with street level interest are encouraged.[101] In some areas including Uptown, a Travel Demand Management plan is required even for small development projects.[102]

The City of Minneapolis has designated a portion of its popular Uptown area as a pedestrian overlay zone. Design regulations ensure that the area will maintain its pedestrian-friendly streetscape and support alternative modes of transportation.

Iowa City, Iowa, has cut parking requirements by one-third in six "neighborhood commercial districts" within two miles of downtown.[103] The reductions account for the 5 to 20 percent of people who will walk or bike rather than drive.[104]

A Central Business District (CBD), or a city's core downtown area, is often treated as a special zone for reduced parking, facilitated by higher densities, good transit access, and provisions to limit congestion. St. Paul, San Diego, Boston, and San Francisco are some of the cities that have no parking requirements in their CBDs.[105] As mentioned, Minneapolis has no parking requirements in the core area of its CBD for nonresidential development up to 400,000 square feet.

2. Set a city or region-wide parking cap
The most aggressive approach to a maximum parking standard is the parking cap. A parking cap limits the total number of public and private parking spaces within a given area such as a city or region. New parking cannot be added unless the cap is lifted or increased. This approach was instituted in Portland, Oregon in 1976.[106] The City placed a cap of 42,500 spaces on downtown

The City of St. Louis Park, Minnesota, reduced many of its parking requirements based on research, parking usage surveys and conversations with developers. In addition, the City provides incentives for new development to accommodate transit and pedestrians and to reduce the amount of on-site parking, including:

- A five to fifteen percent reduction in parking for good access to transit and/or provision of bicycle racks on site
- Up to fifteen percent parking reduction through a Planned Unit Development approval process, provided the developer can demonstrate such development features as good pedestrian connections, enhanced linkages to mass transit, and increased low or moderate income housing
- "Proof of parking," in which a developer can set aside space and delay up to ten percent of the required parking to be developed in the future if needed
- Where buildings are located next to the street (i.e., the parking is to the rear or underground), on street parking counts towards meeting the parking requirements
- The density or floor area ratio of a project can be increased if parking is located below ground
- Shared parking is allowed between businesses or other entities

SOURCE: City of Saint Louis Park Municipal Code, 2002, ch. 36, art. IV, sec. 36-361, 36-367.

parking and invested instead in transit including light rail.[107] Downtown retail and other businesses thrived. An important side benefit was that it was no longer profitable to demolish older buildings simply for surface parking. The cap was lifted in 1996.

Increased transit ridership is key to Calgary's plans to decrease downtown parking spaces while accommodating central city job growth.

Calgary, Alberta, has established a goal for 2024 to reduce downtown parking stalls from 31,000 to 29,000 even though downtown jobs are expected to increase by 30 percent.[108] Calgary plans to achieve this parking reduction by increasing transit ridership to 50 percent of work trips to downtown.[109] The City plans to allow surface parking to gradually be redeveloped to other uses and prohibits construction of new parking unless the parking is required as part of a new development.[110]

3. Manage existing parking supply more efficiently

Often a perceived parking shortage is really a failure to effectively manage the existing supply of parking. In 2000 the City of Seattle conducted an extensive parking survey which found parking use rates of between 40 and 70 percent in many areas of the city; at the same time, residents and businesses were complaining of parking shortages.[111] In response, the City increased parking enforcement and published a parking guide for residents, businesses and community groups that describes a number of parking management techniques.[112] Some of the techniques are:

- Providing clear signage to direct drivers to available parking
- Discouraging employees from parking in customer spaces

- Converting some on-street parking in front of commercial buildings to loading zones, and converting most parking near commercial areas to short term parking only

- Converting on-street parking in residential areas to long-term-only through the use of restricted residential parking zones

- Creating shared lots between businesses in commercial areas

Saint Paul is one city that allows developers to use shared parking to meet minimum parking requirements.

Shared parking: Shared parking occurs when two or more entities, such as businesses, churches, or residential buildings, share a parking facility. The parking may be owned or leased by one or more businesses or organizations. Municipally owned parking typically functions as shared parking. Shared parking is especially effective where demands peak at different times. For example, offices tend to have peak demands during the daytime while restaurants and movie theaters have peak demands in the evenings. Development patterns that encourage mixed uses and are pedestrian friendly help to make shared parking more successful. Many cities including St. Paul and Minneapolis allow developers to use shared parking to meet a portion of minimum parking requirements.

Parking permits: Many municipalities, including St. Paul and Minneapolis, have established permit-parking programs to manage parking in specific neighborhoods. Often, major institutions or central business districts use the on-street "free" parking to the detriment of the adjacent residential area. Therefore, in designated permit-parking zones, annual permits are sold to homeowners and businesses within the zone. Permit holders are then allowed to park on city streets during hours when other drivers are restricted.

In 2002, the City of St. Paul had nearly 30 permit-parking districts.[113] Many of these districts are in locations with high schools and universities. In the same year, Minneapolis had 24 permit-parking districts.[114]

Parking benefit districts: The parking benefit district is a variation on permit parking. Using this strategy, a neighborhood can decide to sell a certain number of permits to employers, employees, or nearby residents who need parking. The neighborhood can control both the number of permits and the price of the permits. A portion of the revenue from selling the permits is used to cover the cost of program management and the neighborhood receives the remainder to spend according to its own priorities.

Permit-parking programs are designed to reduce traffic and parking in specific neighborhoods.

The City of West Hollywood, California, sells residential parking permits allowing daytime parking to employees of nearby commercial areas.[115] San Diego and Pasadena, California, also have programs that dedicate parking meter revenue to the neighborhoods where the revenue is collected.[116] In some cases, parking benefit districts raise more revenue than property taxes.[117]

Parking permit and parking benefit districts play a complementary role relative to parking cash out and the promotion of market-priced parking. These programs ensure that employees who cash out their parking benefit (and forego "free" parking from their employer) do not use parking needed by neighborhood residents within close proximity to worksites. See page 26 for a full discussion of parking cash out.

On-street parking: On-street parking can provide a significant amount of parking, and it can provide overflow parking for special events. It also provides an effective barrier between sidewalks and traffic lanes that improves the pedestrian friendliness of an area. One or two-hour time limits for on-street parking can help keep turnover high.

4. Use pricing and parking fees to achieve transportation goals

A city's parking policies should align with other transportation goals. When parking is priced more rationally, it discourages driving alone and makes other modes of transportation more attractive.

Parking at municipal lots and garages: Municipally owned parking lots and garages offer some advantages from a public policy perspective. Because they are shared parking, they can be strategically located to serve multiple tenants and uses. In addition, preferential parking for carpools or bicycles can be easily implemented.

Cities often set prices at municipal lots or ramps at the market rate, which varies significantly from city to city. In some cities, municipal ramps generate enough money to turn a profit, while in other cities parking charges are only adequate to cover operating and maintenance costs. Both Minneapolis and St. Paul set municipal ramp rates at or near market rates for their cities. Minneapolis' parking generates substantial revenues, whereas St. Paul's revenues only cover operating and maintenance costs.[118] However, both cities own substantial percentages of the downtown parking supply, so it can be argued that they help determine the market rate.[119]

The "correct" amount of municipally owned parking is often difficult to determine. While parking can provide needed access for vehicle drivers, too much parking can encourage driving alone and can undermine the incentive for transit use, biking, and walking. Too much parking or unattractive parking lots and garages can negatively impact the pedestrian environment and increase vehicle congestion. A city should evaluate its financial support for parking in light of its financial support for other modes like transit, biking, and walking.

Downtown parking pricing tends to favor the workday commuter, which reduces a commuter's incentive to use other modes of transportation.

Low-cost, short-term parking at lots and ramps: Parking charges in downtown areas often favor the all-day work commuter. Ramps offer "early bird specials" with lower rates for all day parking or contracts for monthly parking. These parking policies encourage driving and discourage use of transit and other modes in two ways.

First, contract parkers must pay for parking whether they need it everyday or not. If contract parkers want to use transit some days, they still must pay for the parking they are not using. Second, charges at parking ramps often are very high for short periods of time and relatively low for all day parking. This pricing practice hurts the shopper or mid-day driver, while benefiting the all-day work commuter who often has the most transit options. This pricing also competes directly with transit, which typically provides the best service for peak hour commuters. In many regions, the mid-day traveler has limited transit options and has little choice but to pay high hourly rates to park.

Portland, Oregon, has a program that provides the opposite incentive at the City's six municipal ramps. Portland charges drivers only 95 cents per hour for up to four hours of parking under a program called Smart Park.[120] After four hours the parking rate increases to $3 per hour.[121] The City started this program over a decade ago to encourage reasonably-priced parking for shoppers and visitors to downtown.[122]

Parking impact fees: For nearly 20 years, the City of San Francisco has imposed a surcharge of 25 percent on parking fees at all parking garages in the city.[123] The substantial revenue from this surcharge is paid into the City's general fund and a portion of it, along with a portion of parking meter revenue, is used to support MUNI, San Francisco's transit agency. In 2001, 24 percent of MUNI's annual operating budget was paid for with parking revenue from the City.[124]

The City of San Francisco uses parking surcharges to fund a portion of municipal transit operations.

In-lieu parking fees: Some municipalities allow developers to pay a fee to the municipality in lieu of providing the required amount of parking. Parking expert Donald Shoup surveyed 46 cities in several countries including the US and Canada that have "in-lieu" parking programs.[125] The in-lieu parking fee or "buy out cost" is typically equivalent to the cost of providing a parking space in a nearby municipal ramp. Shoup found that the in-lieu fees ranged from $2,000 - $27,000 per parking stall. The cities reported that they favored in-lieu fees as a way to encourage historic preservation and better urban design and to promote shared parking.[126] A municipality can use in-lieu fees to develop a municipal parking site, provide on-street parking, develop commuter programs, or improve transit.

The in-lieu parking strategy also allows comparison of alternatives for reducing parking demand. For example, an employer might offer all employees a free transit pass to reduce parking demand by 20 percent. The developer could then provide 20 percent less parking thus reducing costs significantly – even when the cost of the transit pass is included.

5. Provide shuttle services and fare-free zones

Shuttle service between parking facilities and major destinations like civic centers and sports facilities can reduce the need for huge adjacent parking structures. Metro Transit, the largest transit operator in the Twin Cities region, has been successfully operating special event shuttles to the Minnesota State Fair, Vikings football games, St. Paul's annual Taste of Minnesota celebration, and other events. The City of St. Paul is working with Metro Transit to expand these efforts. In addition, in St. Paul, smaller, private companies are using shuttles to downtown entertainment venues from restaurants on commercial strips outside of downtown.[127]

Extensive downtown transit service or transit service with low or no out-of-pocket costs to riders can improve downtown accessibility and reduce the need for downtown parking. Portland, Oregon's fare-free zone downtown makes downtown accessible and reduces the need for parking. In Denver, "free" shuttle buses on a downtown transit mall greatly reduce the need for parking near major attractions.

6. Limit parking subsidies for new development

While financial incentives can be an important tool for development, subsidies should be evaluated in light of financial support for alternative modes of travel and with an eye to their impact on other community goals. According to the Minneapolis Planning Commission, "the City should not subsidize development that results in free or below market parking costs to users of the facility."[128] While the Planning Commission has not historically held projects to this standard, their recent rhetoric suggests a recognition of the problem.[129]

The City of Cambridge, Massachusetts requires a Travel Demand Management plan as part of any development that will increase nonresidential parking.

7. Require Travel Demand Management (TDM) plans for new developments

Cities including Minneapolis, have been effective in reducing the need for parking by requiring developers to have a Travel Demand Management (TDM) plan approved as part of the process for issuing building permits. TDM plans often include requirements and incentives to encourage transit use, biking, walking, carpooling and telecommuting (working from home).

St. Paul and Eden Prairie, a Twin Cities suburb, use a voluntary process to encourage completion of a TDM plan. The Eden Prairie City Council informally requires a TDM Plan for all new office or industrial developments. While this requirement is not in the City Code, officials inform developers of this expectation and, most importantly, require that "a letter of credit or bond" be established for the proposed TDM measures.[130] The financial guarantee provides an important accountability system for insuring that the TDM measures are implemented in a timely manner.[131]

Cambridge, Massachusetts, requires approval of a Parking and Travel Demand Management Plan (PTDM plan) for any development that will increase nonresidential parking.[132] Some of the suggested measures to include in a PTDM plan are: subsidized transit/rail passes for employees, ride-sharing services, shuttle services, bicycle and pedestrian facilities, and preferential parking for non-single occupancy vehicle (SOV) vehicles and bicycles.[133] The developer is also required to make reasonable efforts to achieve specific, numeric reductions in SOV trips.[134] The PTDM plan must be approved before the project receives other building or planning permits.[135]

The City of Cambridge has an even more rigorous review process for large development projects (those over 50,000 square feet).[136] Large project review includes analysis of traffic generation patterns, anticipated effect on traffic congestion, bike and pedestrian facilities, accidents, and anticipated SOV versus non-SOV use.[137] Any anticipated negative impacts must be mitigated.[138]

8. Establish guidelines for the location and design of parking lots and ramps

The location and design of parking lots and ramps influence the impact such facilities have on a streetscape or development. Parking lots can be located to the rear or side of the building they serve so the building can be constructed at the street or sidewalk. Parking facilities can include vegetation to improve their appearance, create a comfortable walking environment, and reduce runoff. Parking lots can include separate pedestrian walkways to increase safety.

Parking ramps can be designed to blend with other buildings and minimize disruptions to the streetscape. Cities can require parking ramp design to adhere to some of the same architectural requirements as other buildings, and ground floor retail or office uses can be required or encouraged. The City of Minneapolis requires some architectural detail on the street level floor of ramps and garages and encourages ground floor commercial uses.[139]

Design guidlines in Saint Paul, stressing ground-floor retail and attractive design elements for parking structures, influenced the appearance of the new Lawson Software parking ramp.

The City of St. Paul recognized the importance of parking design and location in its Development Framework for Downtown (1997).[140] Guidelines from the Framework have influenced the design

of some parking structures in downtown, including the parking ramp in the Lawson Software building, which includes ground floor commercial uses and architectural details on facades that face the street.

9. Support transit-oriented development and traditional neighborhood design

In 2001, the City of St. Paul tried reducing parking requirements through an "urban village" zone which established lower parking minimums than the rest of the city. The results have been unremarkable, with little success in reducing parking in new developments or redevelopments.[141] The City is now going a step further by proposing three new Traditional Neighborhood or "TN" zones, which would include parking maximums.[142] Two of the zones are intended to promote compact, walkable development and a mix of uses and housing types in areas well-served by transit, principal transit corridors, or major transit nodes. The third TN zone is intended for higher density, mixed use developments on larger tracts of land or redevelopment sites.

Minimum parking requirements in the zones would in most cases be reduced by 25 to 33 percent, and parking maximums would be approximately equal to the typical minimums in other parts of the city.[143] However, the proposed maximums may still not be enough to limit parking. The maximums could still be exceeded through underground or tuck-under parking (tuck-under is an enclosed garage space with residential or other space built directly above).[144] Furthermore, it is uncertain that the maximums will be approved as part of the new zoning by the City Council.[145]

This mixed-use, pedestrian-friendly building is located on one of the region's busiest bus lines at Selby Avenue and Dale Street in Saint Paul.

The proposed zoning is consistent with St. Paul's recent policies on redevelopment and creating transit-oriented development outside of its downtown area. As one city planner stated:

> "We believe that, over time as St. Paul changes, redevelopment along corridors will bring a natural gravitation to transit and living/working situations that do not require automobiles. We believe that this is the most important step we can make in the long term to be economically competitive and create real options to car-dependency."[146]

C. Employers

Employers reinforce automobile-oriented planning by providing "free" or subsidized parking to employees and by not providing a comparable benefit to employees that choose to bus, carpool, bicycle or walk to work. Employers need to charge employees the true cost of parking as a disincentive to driving alone and provide equivalent incentives for other modes. Four options are discussed here.

1. "Cash-out" parking for employees

Parking cash-out refers to employers offering employees the cash equivalent of any parking subsidy the employer normally provides.[147] In recent years, the Internal Revenue Service has attempted to mitigate the negative impacts of tax inducements that favor driving to work alone. In 1997, federal tax law was changed to allow employers to offer tax exempt transit and vanpool passes in lieu of parking space.[148] Employers can also offer employees the cash equivalent of the parking subsidy, but this cash payout is not tax-exempt.[149] The employer will charge employees for parking, and the employees then decide how to use the cash—paying to park, purchasing a bus pass, or keeping the cash and walking or biking.

Parking cash-out can significantly reduce driving and the need for parking, especially when augmented with high quality transit. Cashing out employer-paid parking is shown to reduce solo driving. A study of eight firms in California which implemented the program saw solo driving fall by

17 percent.[150] Similar results were achieved in case studies with seven Twin Cities employers.[151] Parking cash out is now particularly attractive to employers in the Twin Cities because they can receive a state corporate income tax credit equal to 30 percent of their expenditure on bus or vanpool services for employees.[152]

Thrivent Financial for Lutherans, based in Minneapolis, recently implemented a parking cash-out program with transit incentives. More employees now carpool or ride the bus to and from work.

Thrivent Financial for Lutherans (formerly Lutheran Brotherhood), located in downtown Minneapolis, began offering its employees a parking cash-out in 2001, and the results have been positive. The company has a 700-space parking lot and approximately 1,600 employees. Because of the parking cash-out program, previously free parking stalls are now available to everyone who wants one – at a cost of about $5 per day.[153] All employees receive between $50 and $100 per month which they can spend on parking or as they wish.[154] The program has resulted in more employees carpooling or riding the bus, and those who had previously foregone the "free" parking now get an equal subsidy.[155]

Parking cash-out has proven successful in suburban settings as well. When employees at Super Valu in Eden Prairie, Minnesota were offered a $3 per day incentive not to drive, six percent elected to choose an alternative to driving alone.[156] This mode shift was accomplished despite minimal transit service. Supervalu, in effect, cashed out the cost of future parking stalls that would have been required if drive-alone rates remained unchanged.

In Bellevue, Washington, the City's Transportation Development Code requires office buildings larger than 50,000 square feet to have a separate line item for parking costs in tenant leases.[157] The requirement highlights the cost of parking compared to building rent and makes it easier for employers to cash out parking for employees. Employers are also required to charge at least the cost of a typical monthly bus pass for long-term parking.[158]

2. Establish preferential and/or reduced rate parking for carpools

Employers can provide preferential parking for employees who carpool by simply reserving a number of spaces for carpools close to the building entrance in a shady or protected spot. The City of Seattle supports this strategy by giving carpoolers preferential parking on city streets.

Minneapolis runs a program that offers carpoolers reduced parking rates in municipal ramps. Carpoolers coming from the west on I-394 are guaranteed a parking stall for $40 per month.[159] Carpools coming from the South on I-35W can park for $85 per month, which is substantially below the market rate.[160] Other ramps have less generous discounts and suffer from long waiting lists.[161] In addition, both Minneapolis and St. Paul have numerous "free" surface parking spaces for carpoolers on the fringe of downtown.[162] Finally, St. Paul has persuaded some private parking operators to offer a discount for carpools.[163]

3. Offer employees opportunities and/or incentives

Employers can provide incentives to reduce drive-alone trips to work. There are many options, and large employers often use several strategies in combination with each other, especially as part of a TDM plan. Some companies provide prizes, transit subsidies, guaranteed ride home programs,

and provision of bike lockers and showers.[164] In Minnesota, companies that subsidize the cost of bus or vanpool passes for employees can claim a corporate income tax credit of 30 percent of the amount they spend on these programs.[165] The University of Minnesota has achieved a significant reduction in drive-alone commuters through several measures, including aggressive marketing, discounted bus passes, and providing bike lockers and bike racks on campus buses.[166]

Macalester College in St. Paul has several innovative programs that reduce the need for parking at and around its campus. The college requires freshman to live on campus and prohibits them from having a vehicle. It makes passenger vans available to groups of students to use for errands and outings, and provides financial incentives to encourage staff to live within walking distance of campus.[167]

Even small employers can offer simple alternatives such as staggered work hours, telecommuting one or more days per week, or simply providing transit information on site. Regardless of the size of the employer, management leadership is a critical component for success. At American Express Financial Advisors in downtown Minneapolis, numerous high-level employees ride the bus, setting the tone for a company-wide drive-alone rate of only 25 percent.[168]

4. Incorporate transportation and transit considerations into location and design decisions

Employers who locate near good transit and ensure good pedestrian connections to and through their property can give employees alternatives to driving and relieve traffic congestion. Traffic congestion and parking is further reduced if a company is located near employees' homes or in or near a community where its typical employees can afford homes. Through these actions the employer may be able to reduce the amount of parking it provides, which may in turn lower development and operating costs.

Macalester College in Saint Paul has several innovative programs designed to reduce parking demands on and around its campus.

CONCLUSIONS AND RECOMMENDATIONS

Parking is an important public policy issue and decisions about parking have far reaching consequences. While parking provides many benefits, parking that is over supplied, subsidized, or poorly designed results in hidden costs and has negative social, economic and environmental impacts.

In the Twin Cities region, more money is spent on parking annually than is spent on streets and roads and government invests more in off-street parking than it does in public transit. For most drivers the costs of parking are hidden.

Parking requirements raise the cost of development projects and can be a significant contributor to the cost of housing – especially affordable housing. Surface parking lots and above ground ramps contribute to the urban heat island effect, and run-off from rain and melting snow damages rivers, lakes, and streams. Excessive or poorly deigned parking results in unappealing streetscapes and creates barriers to walking and biking.

Governments, employers, businesses, and others say that there are not enough alternatives to driving and parking. In order to significantly reduce the need for parking, drivers must be offered alternative means of travel. A strong public transit system, good sidewalks, bike lanes or paths, and walkable destinations all make it more likely that people will not need to drive and park.

Much can be done to better estimate the future need for parking, to efficiently use the parking that exists, and to make parking facilities more aesthetically pleasing. Parking can also be used as a tool to help communities achieve other transportation or community goals. Many innovative practices and programs from the Twin Cities region and other North American cities provide useful examples.

Metropolitan Airports Commission billboard. Government must balance the desire for parking revenue with policy goals in transportation, land use and environmental protection.

The following recommendations for the Twin Cities region apply to employers and businesses, local units of government, the Metropolitan Council, the Minnesota Department of Transportation, and the Minnesota Legislature.

Recommendations for employers and businesses

Free employee and customer parking play a role in growing levels of traffic and traffic congestion on highways and neighborhood streets. Free parking is a subsidy for driving. Employers and businesses can adopt practices that treat employees equitably no matter how they get to work. These recommended practices could reduce costs for employers and businesses. They are as follows:

1. Charge employees the full cost of parking or provide a cash allowance instead of free parking

2. Provide employees equivalent incentives for other modes (carpooling, transit, bike, and walk)

3. Consider transit, pedestrian and bike access when making long term location and design decisions

4. Support the use of parking meters along busy streets in commercial areas

5. Carefully manage employee parking to maximize opportunities for retail customer parking

Recommendations for local governments

Local governments are directly responsible for setting parking requirements, managing supply, and enforcing parking regulations. There are many steps that city and county government can take to better manage parking that currently

exists and to reduce the need for additional parking. The relevance of these recommendations will depend on a city or county's size and density, access to transit, and other factors. They are:

1. Conduct parking use studies to better align parking requirements with actual needs

2. Evaluate parking requirements in light of the availability of transit service, bike and pedestrian access, and development and density goals

3. Consider establishing parking caps and maximum parking ratios in some areas

Grand Avenue in St. Paul. Local government can provide technical assistance on parking management to businesses, neighborhood organizations and others.

4. Encourage shared parking

5. Provide technical assistance on parking management to businesses, neighborhood organizations, and others

6. Plan for compact, mixed use, transit-supportive development that encourages transit use, walking, and biking, and reduces the need for parking

7. Set parking rates at municipal ramps and lots to reflect the full capital and operating costs; use commuter parking charges to subsidize short-term parking rates for shoppers, tourists, or others

8. Prioritize investments in transit use, biking, and walking over public investments in parking

9. Regulate the design of parking lots and ramps to improve aesthetics and encourage walking and biking

10. Consider taxing parking to raise revenue to support transit, carpooling, biking, walking and other modes of travel

11. Consider establishing a parking "in-lieu" fee in areas to protect historic structures from demolition or to raise revenue for transit or other alternatives to parking

Recommendations for the Metropolitan Council

The Metropolitan Council is in a key position to provide leadership on parking due to its oversight of regional transportation and land use planning and its charge to operate the region's largest public transit system. Better managing existing parking, and reducing the need for new parking are critical to increasing development densities, making housing more affordable, and creating environments that are transit, pedestrian and bike friendly.

Because of competition between municipalities for jobs and tax base, individual communities find it nearly impossible to reduce parking requirements by themselves. Metropolitan Council leadership could change this. The Metropolitan Council should:

1. Analyze and discuss the role "free" and abundant parking plays in congestion and mode choice in regional planning documents including Blueprint 2030 and the Transportation Policy Plan

2. Establish region-wide minimum and maximum parking requirements in accordance with transit availability, pedestrian accessibility, and regional and local transportation and land use goals

3. Establish long term goals for reducing parking spaces per capita in the metropolitan region

4. Provide planning assistance or funding for local parking utilization surveys

5. Target federal and state transportation and Livable Communities grants to transportation and development projects that reduce or creatively manage parking

6. Encourage municipalities to require major employers to prepare Travel Demand Management Plans

7. Include a scenario in the regional transportation model that involves increased charges for parking, TDM plan requirements, and reduced parking requirements. Use this scenario to evaluate major transportation projects that are proposed

Recommendations for the Minnesota Department of Transportation (MnDOT)

MnDOT is responsible for developing and managing Minnesota's statewide transportation system. Given the role that "free" and ample parking plays in mode choice and congestion, parking should a part of MnDOT planning.

Specifically MnDOT should:

1. Analyze and discuss the role that "free" and abundant parking plays in traffic congestion and mode choice in agency transportation planning documents including the Statewide Transportation Plan and the Metropolitan Transportation System Plan

2. Work with employers and others to encourage them to charge drivers the real cost of parking or provide an equivalent benefit for transit users, cyclists, carpoolers, and walkers

3. Provide technical assistance to municipalities on parking management

4. Cash out employee parking and provide incentives for carpooling, transit use, biking, and walking

Recommendations for the Minnesota Legislature

Parking policy is relevant as a transportation, development, and resource conservation issue. Today, the Minnesota legislature plays virtually no role in parking policy despite the fact that it provides the policy and funding framework for managing Minnesota's transportation system and natural resources. The legislature should:

1. Provide increased and stable funding for public transit to enable Minnesota employers to reduce their spending on parking and provide Minnesota citizens with alternatives to driving alone and parking

2. Require MnDOT and the Metropolitan Council to address parking in their systems plans and to identify the ways in which parking should be addressed on a regional basis

3. Fund MnDOT and the Metropolitan Council so they can provide technical assistance to local communities on parking regulation and management

Offices of the Minnesota Department of Transportation (MnDOT). MnDOT could take a more active role in parking policy

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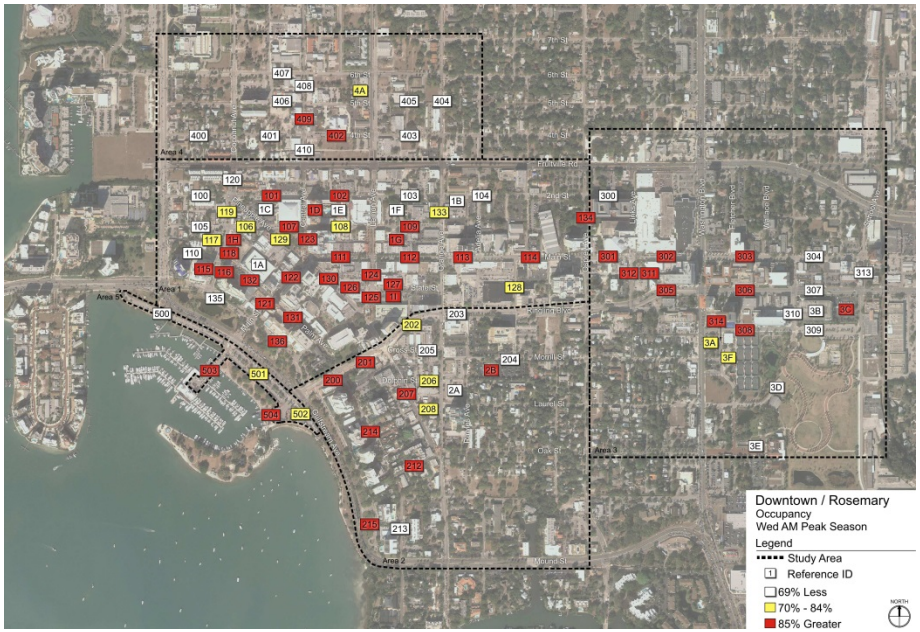

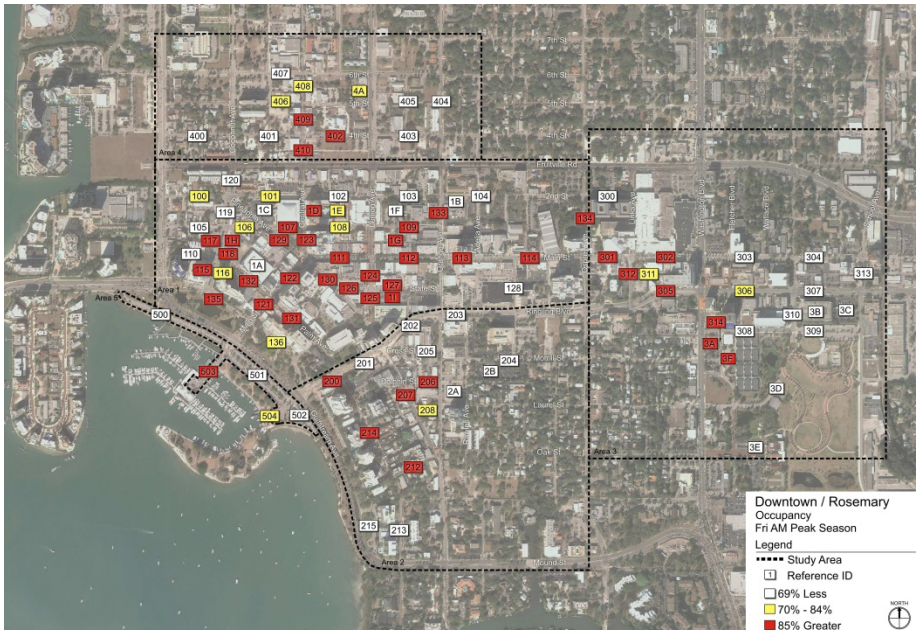

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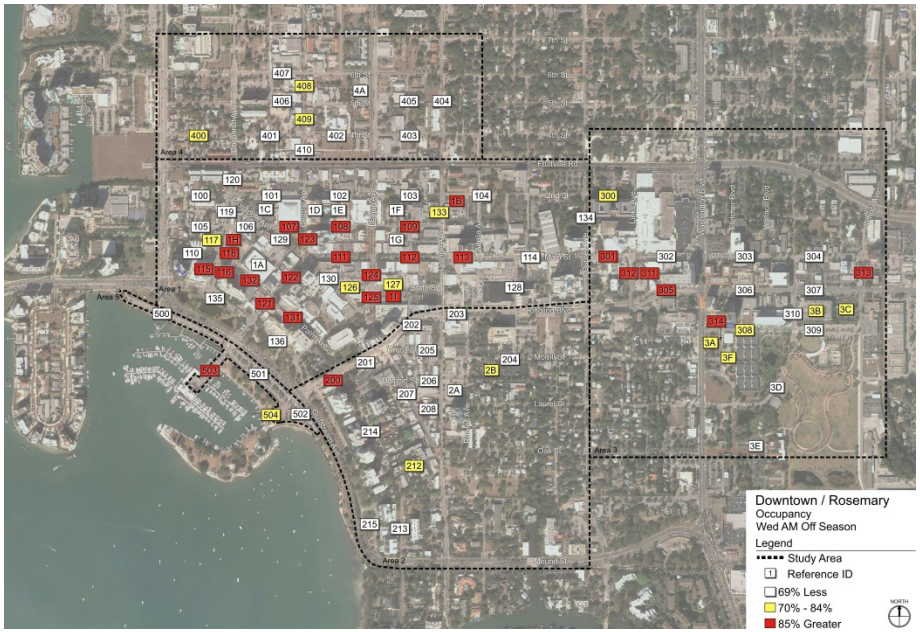

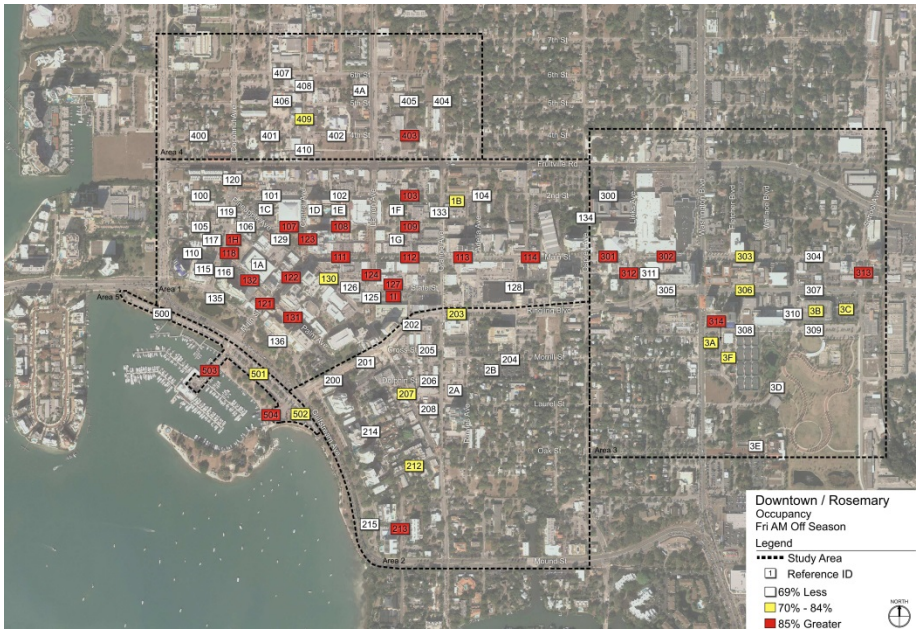

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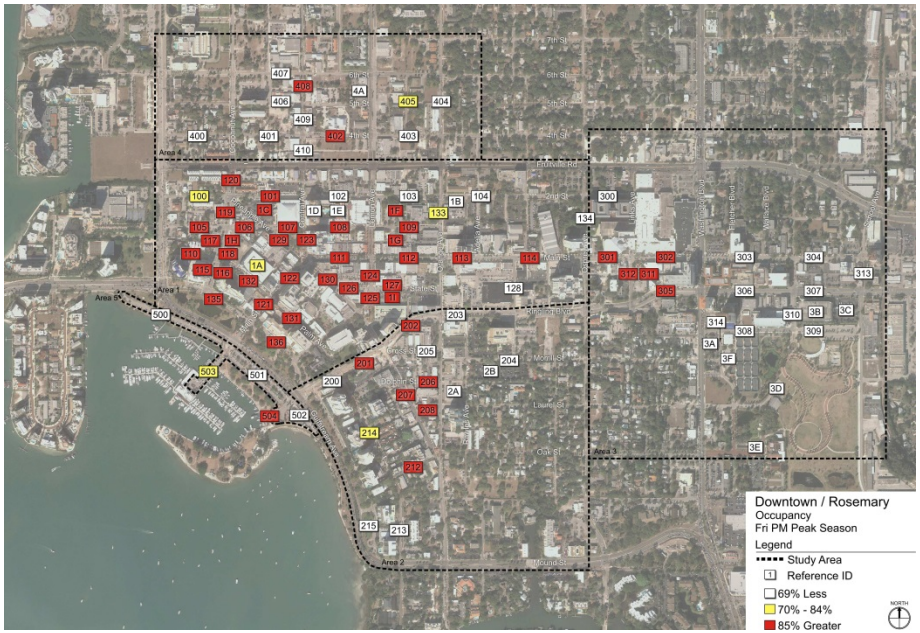

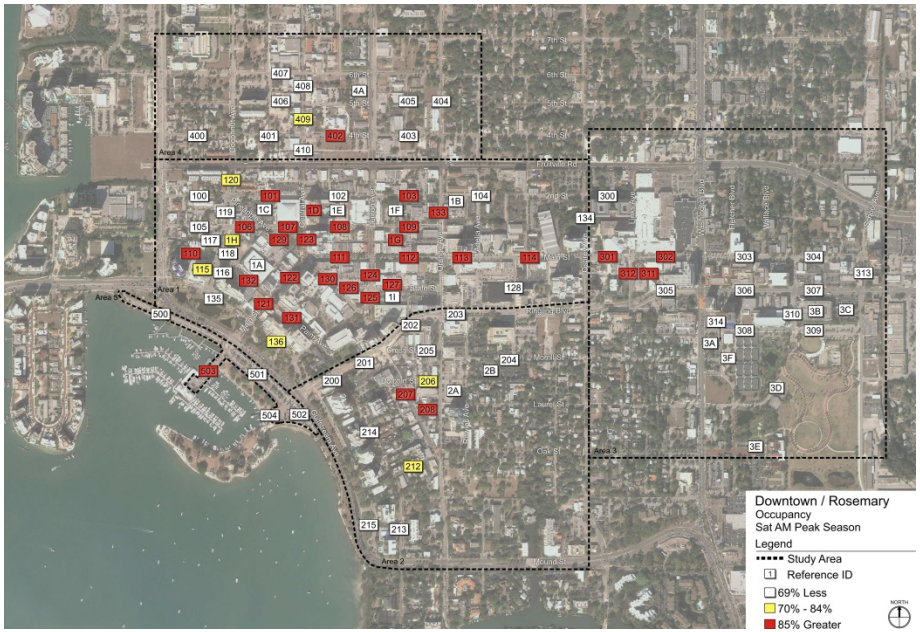

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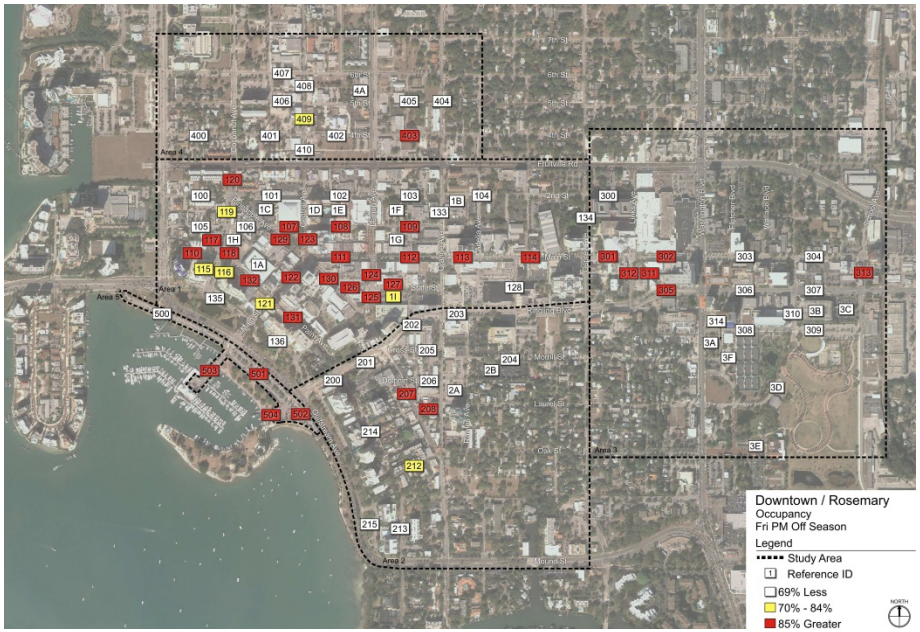

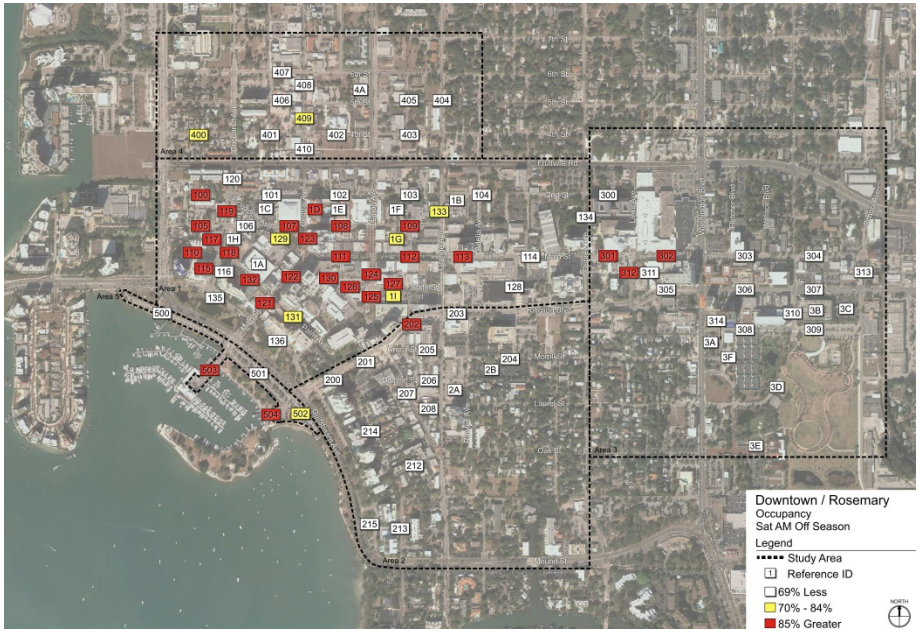

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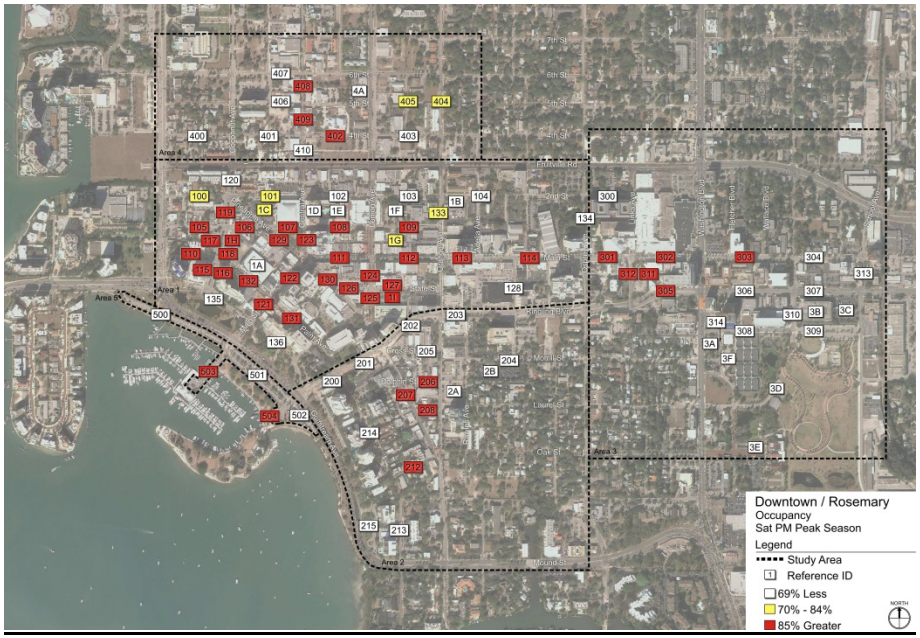

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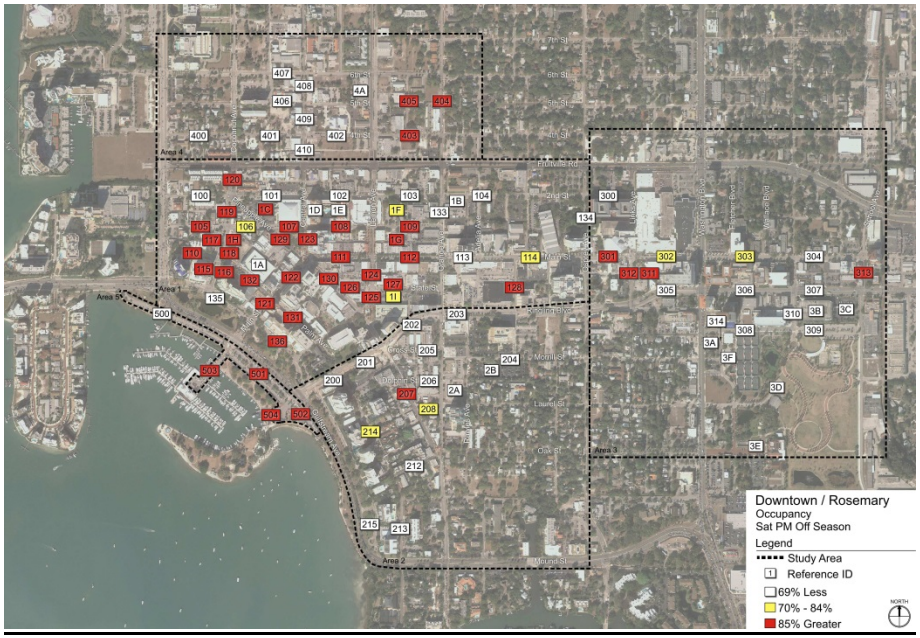

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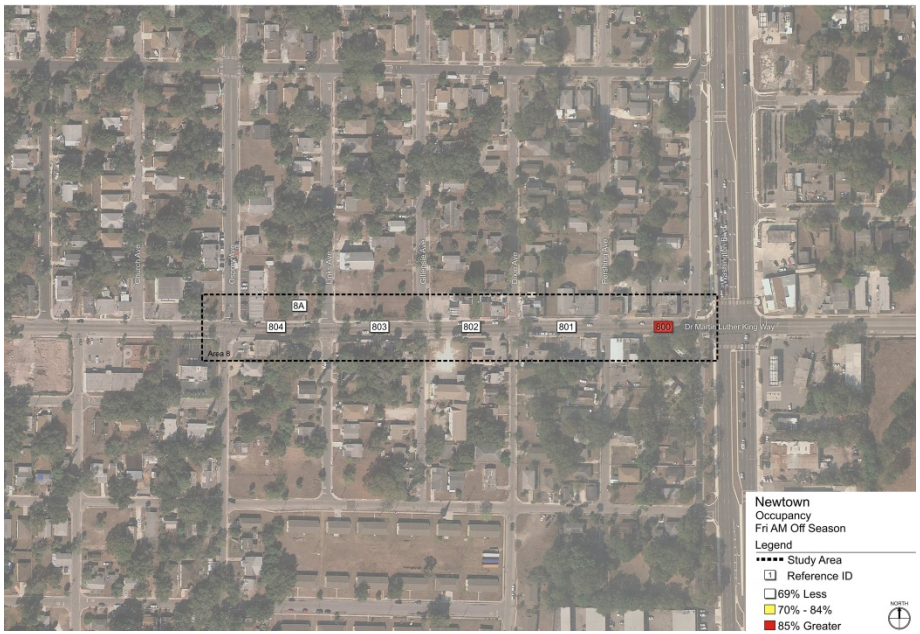

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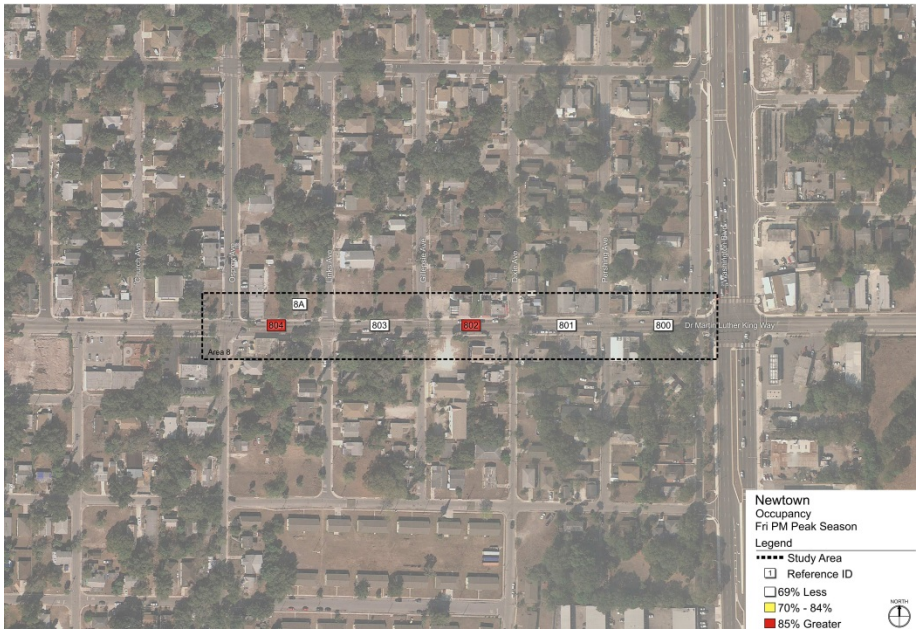

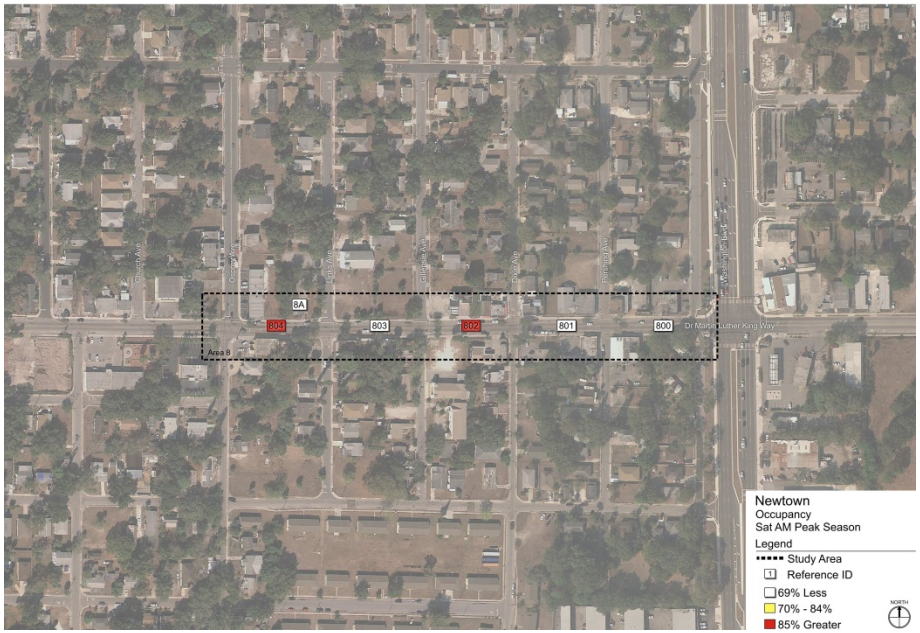

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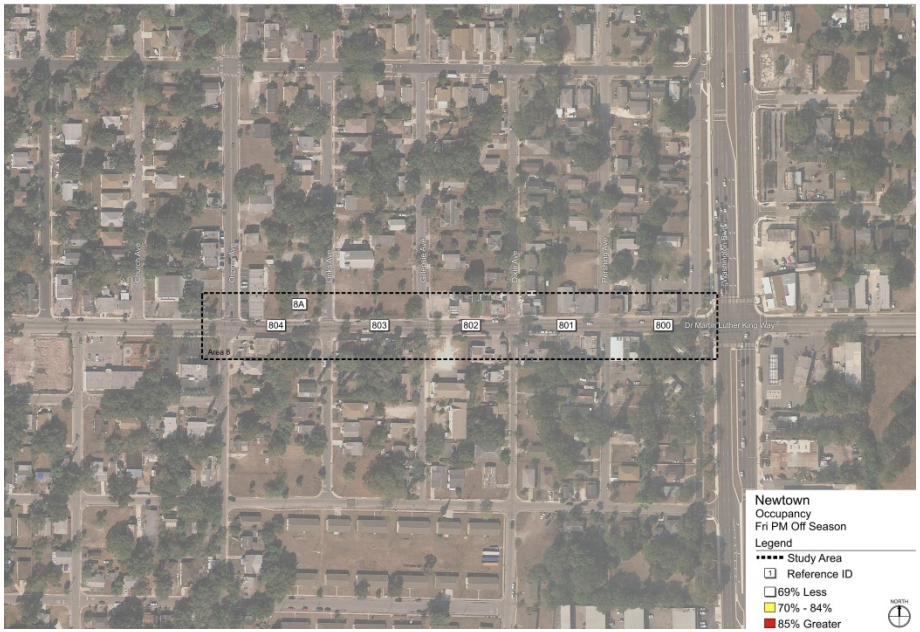

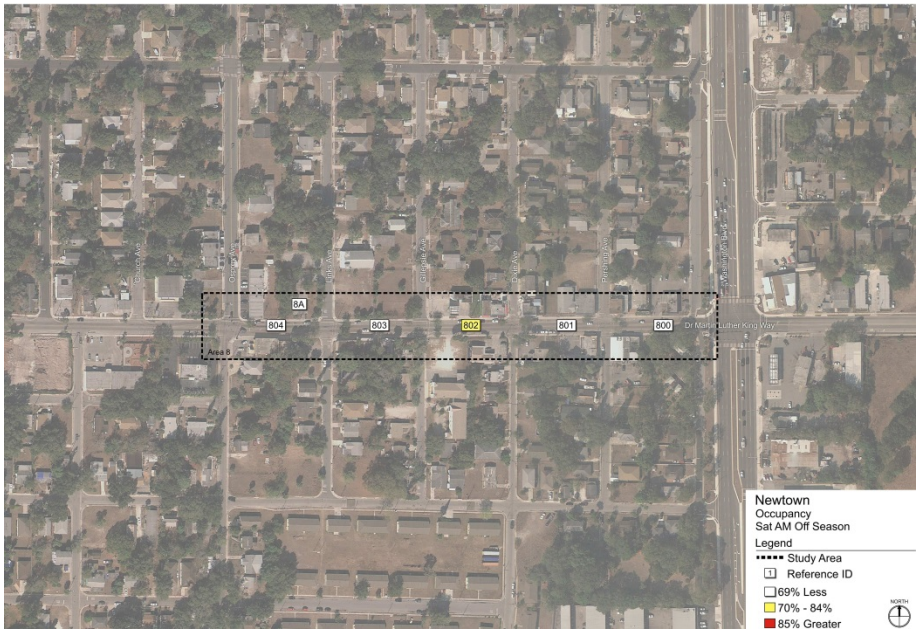

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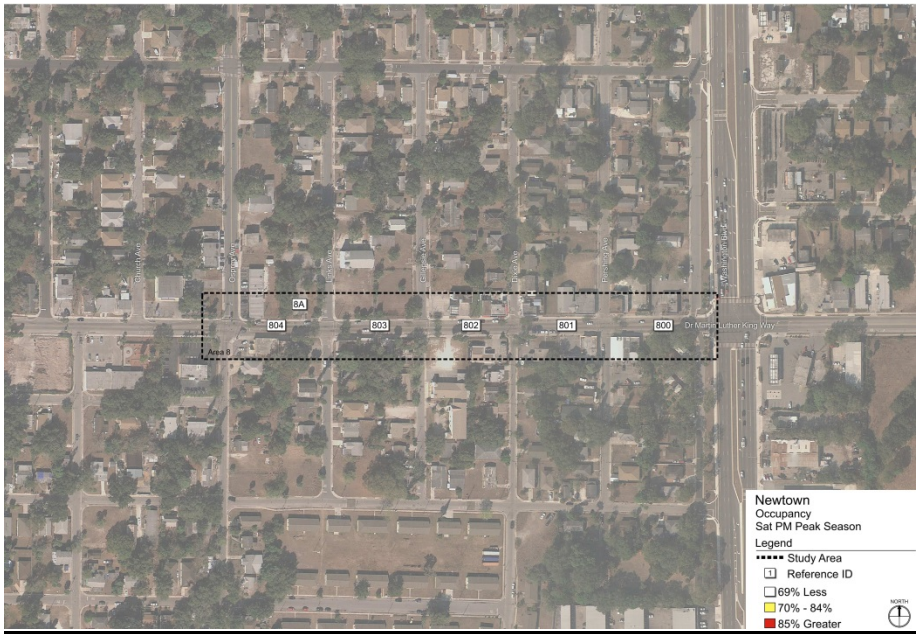

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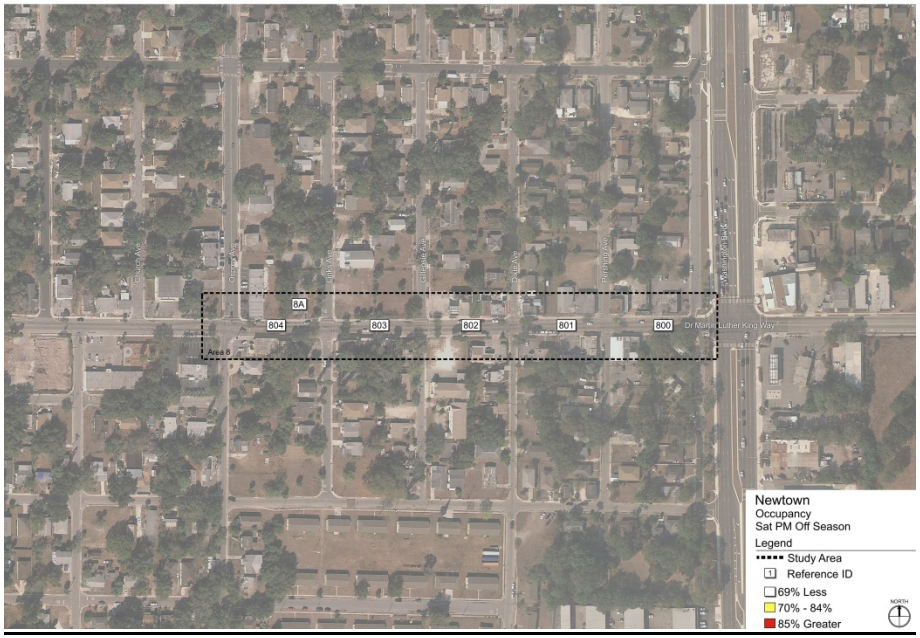

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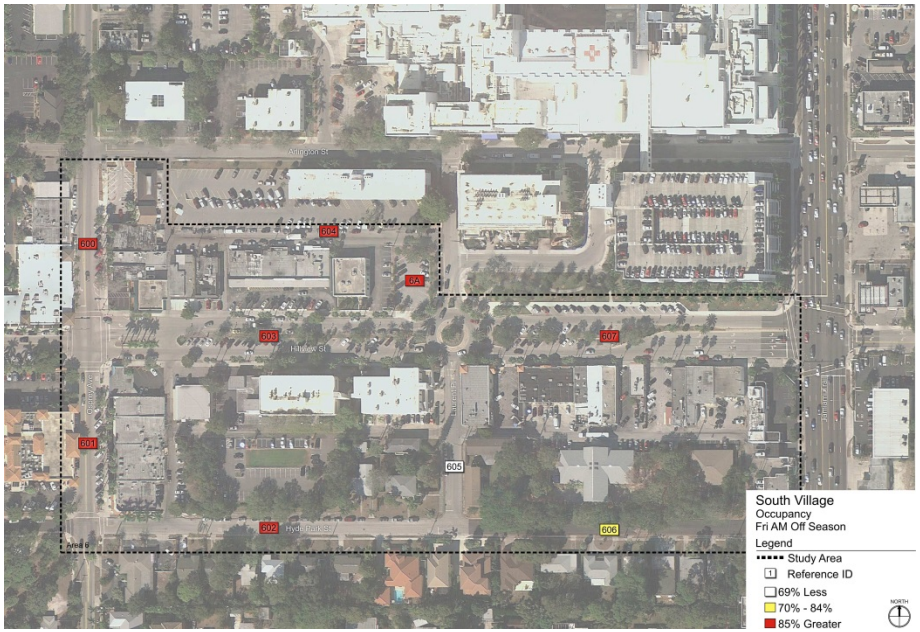

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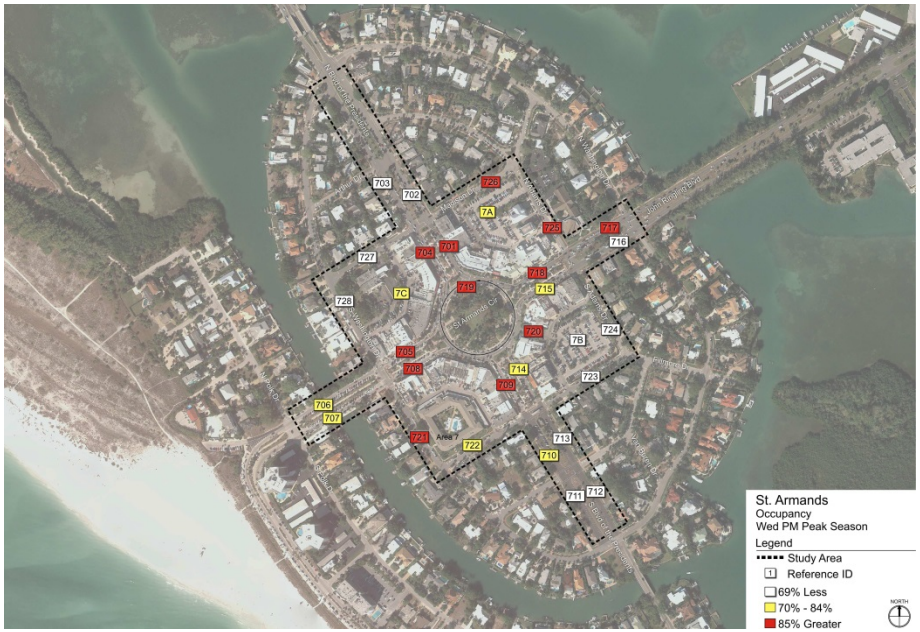

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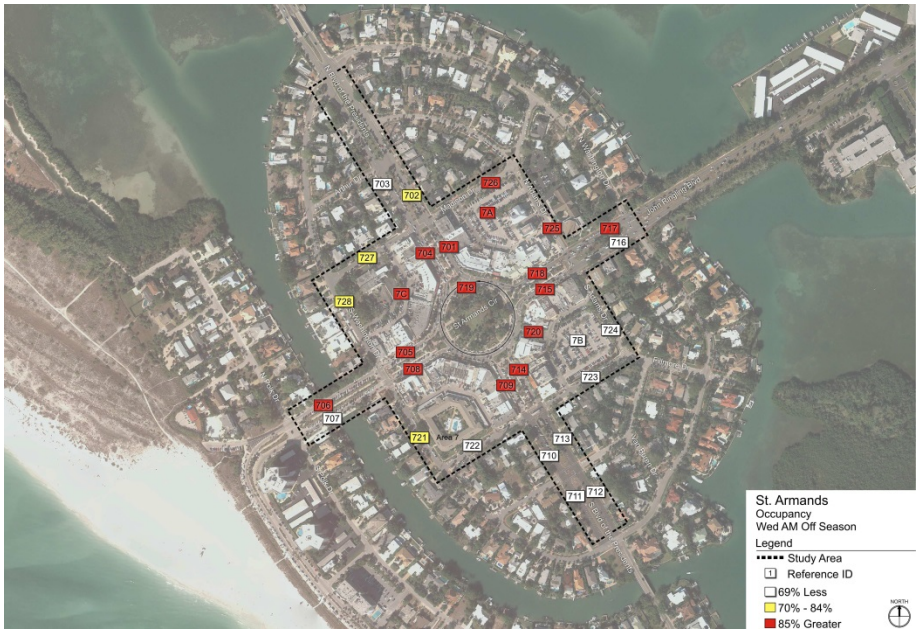

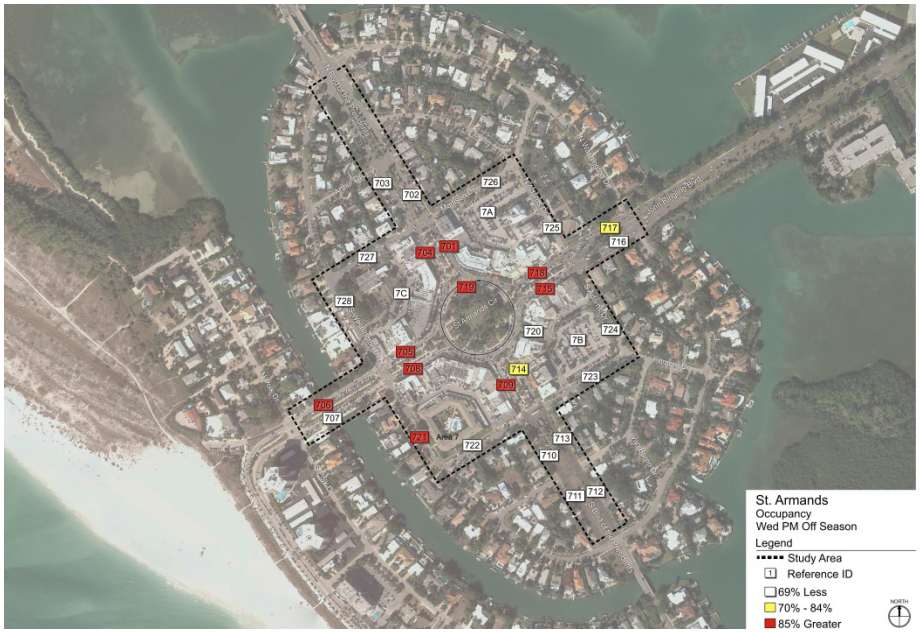

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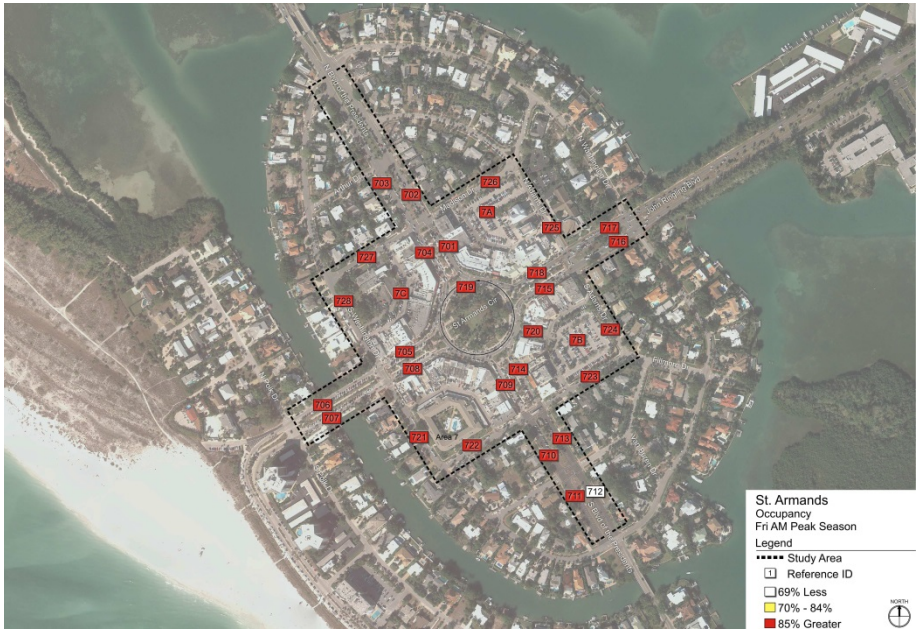

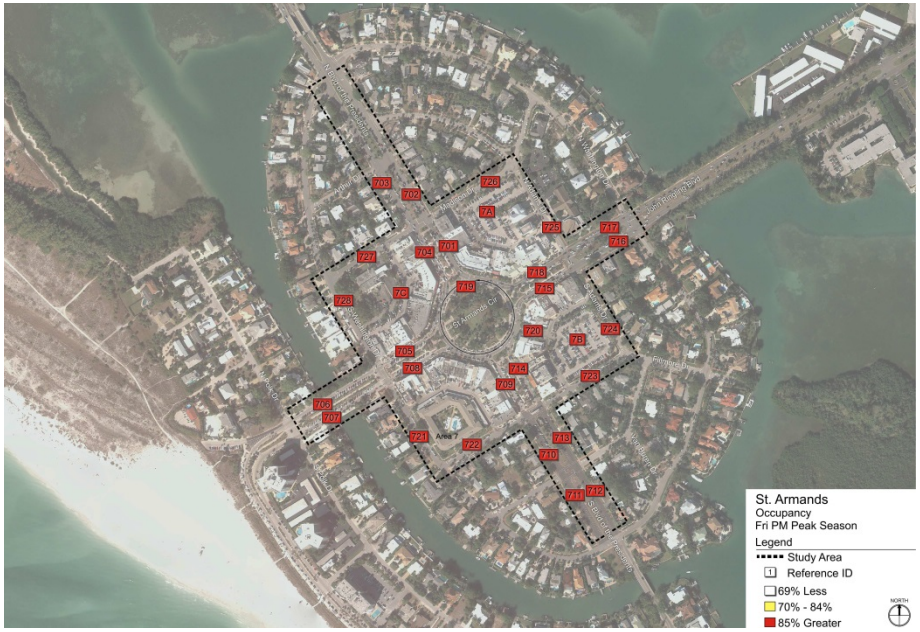

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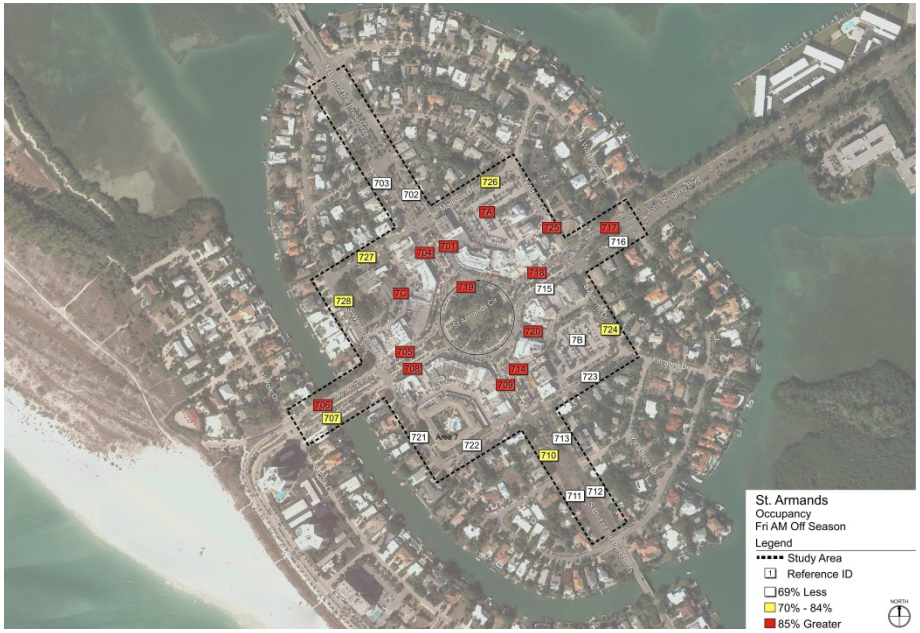

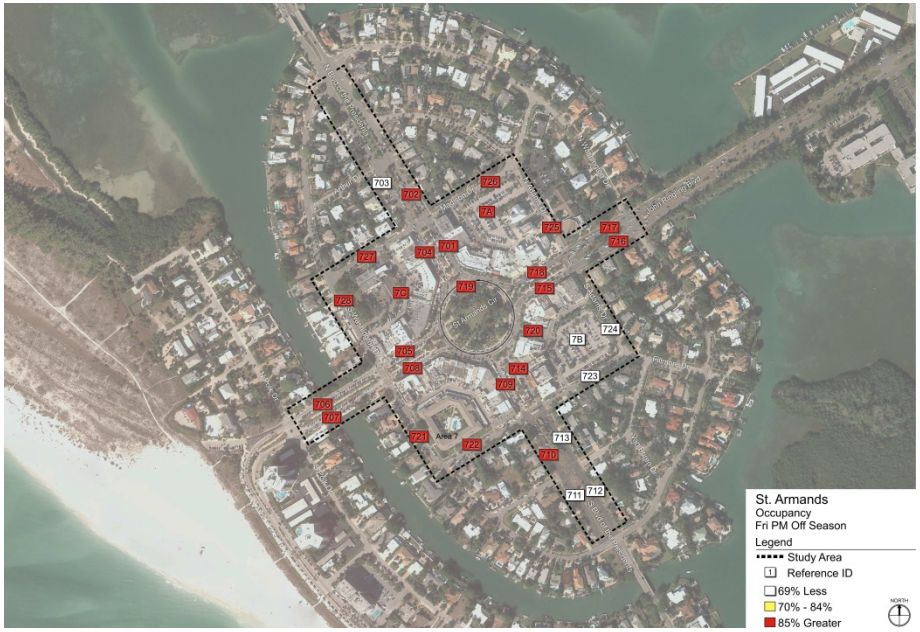

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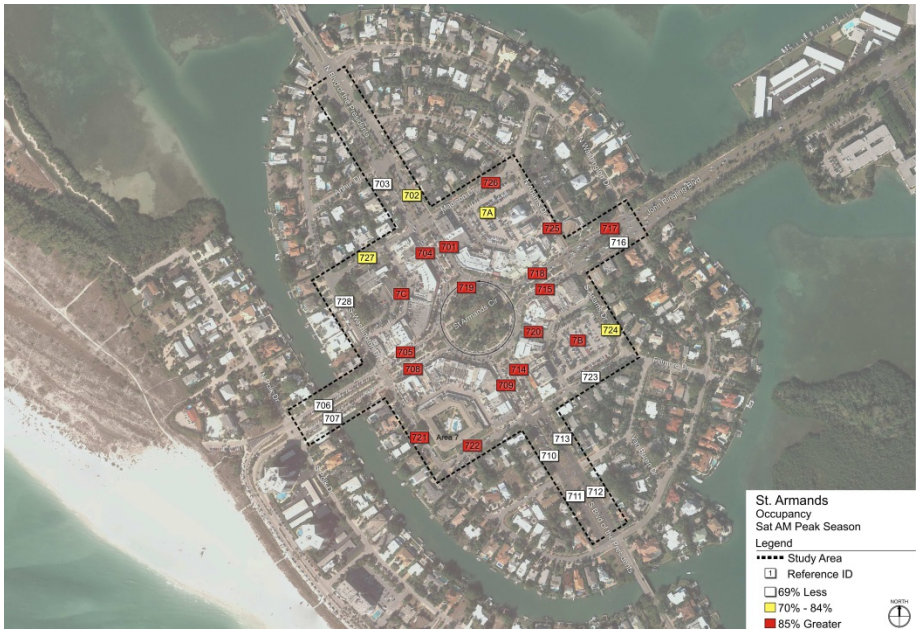

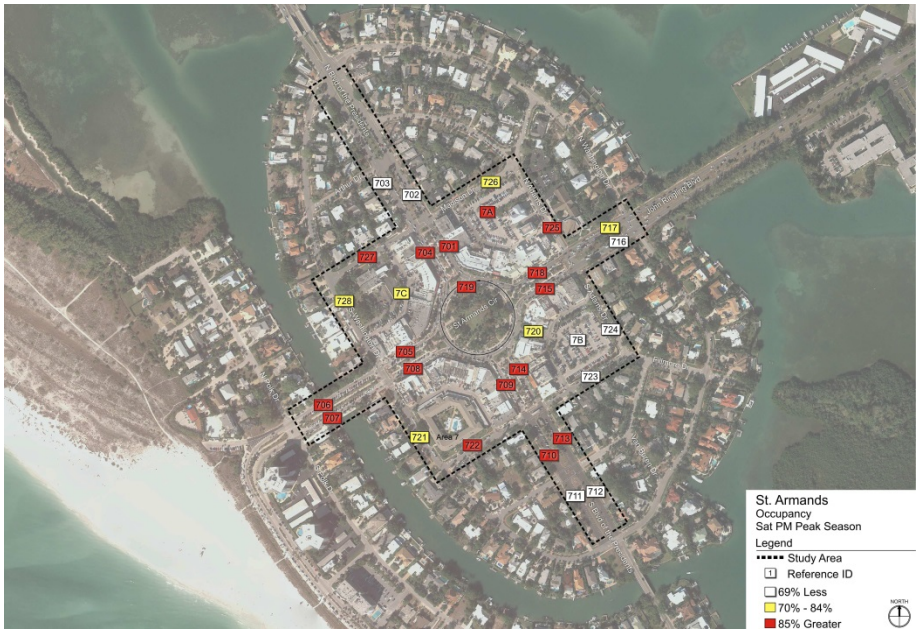

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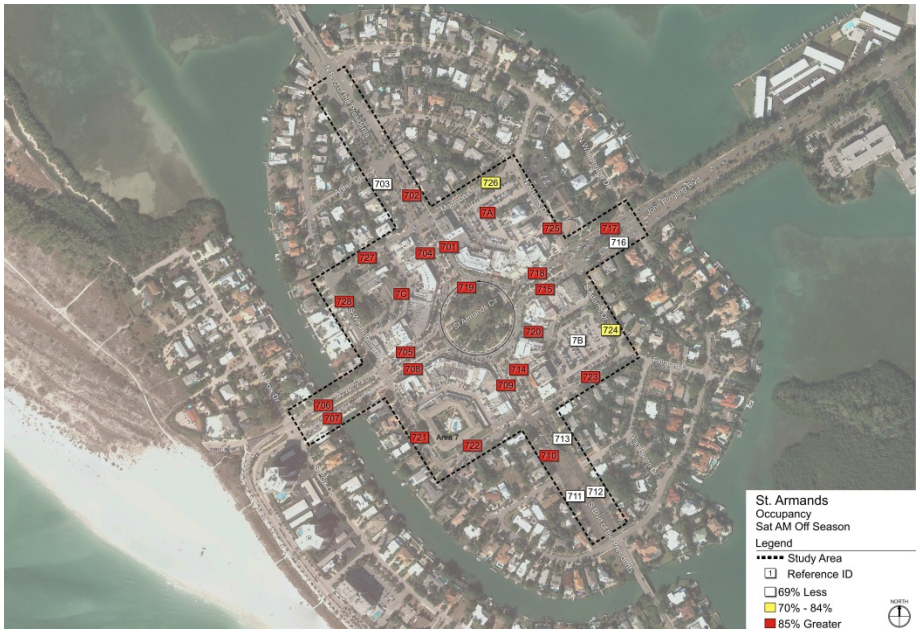
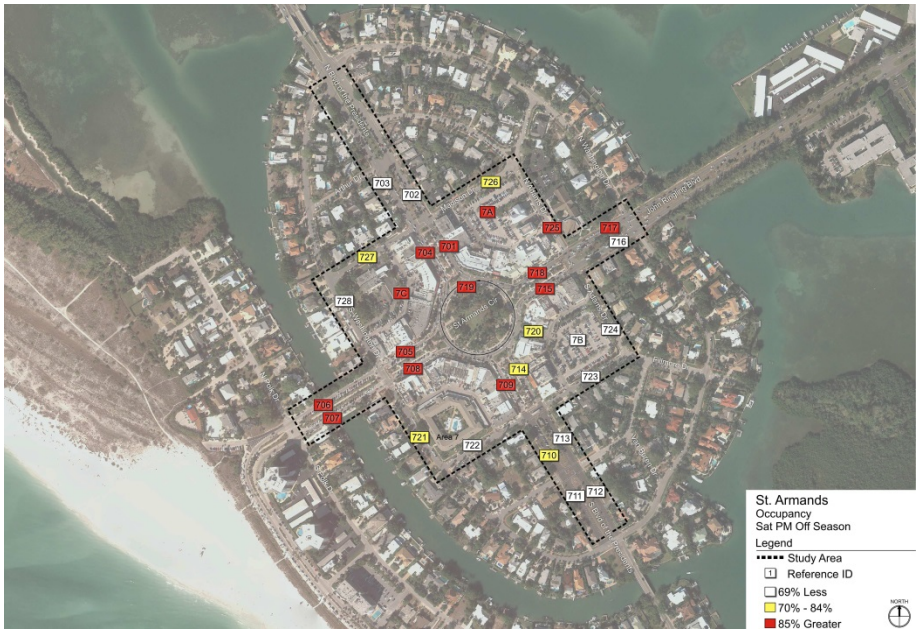




2015 Emerging Trends in Parking

Report on a survey conducted by
the International Parking Institute

Parking isn't just about parking anymore.

New parking technology and a focus on
sustainability broaden the role of parking professionals
in creating more livable, walkable communities.

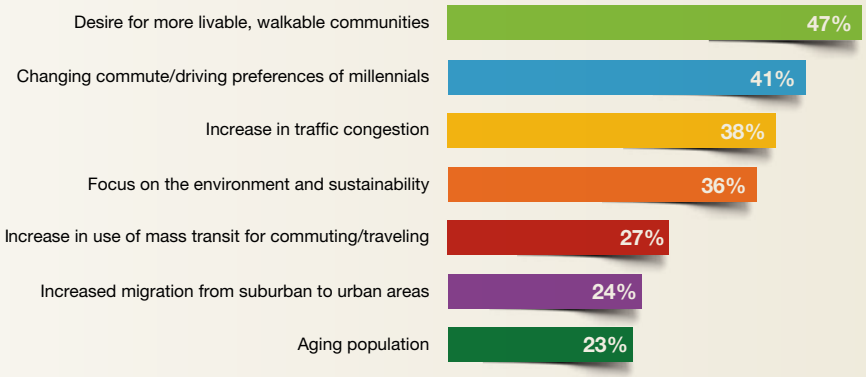
parking.org

According to the results of a new survey by The International Parking Institute (IPI), technology and the desire for more livable, walkable, sustainable communities continue to transform the ever-evolving parking industry. In addition to tracking trends, IPI's 2015 *Emerging Trends in Parking* survey explores perceptions of parking, zoning issues, accessible (ADA) placard abuse, and parking as a career.

Parking Has Moved Far Beyond Simply Parking Cars

For the first time since the survey was initiated in 2012, the desire for more livable, walkable communities emerged as the single-most significant societal change affecting the parking industry (cited by 47 percent of respondents), ahead of the "changing commute/driving preferences of millennials" (41 percent), "increase in traffic congestion" (38 percent), and "focus on the environment and sustainability" (36 percent). Among the societal changes showing a noticeable drop from previous surveys was "fluctuations in gas prices," perhaps reflecting recent lowering and stabilization of gas prices.

What Societal Changes are Influencing Parking?



Tracking Trends Over Time
Desire for livable, walkable communities
2015 #1 answer
2013 #3 answer
2012 #4 answer

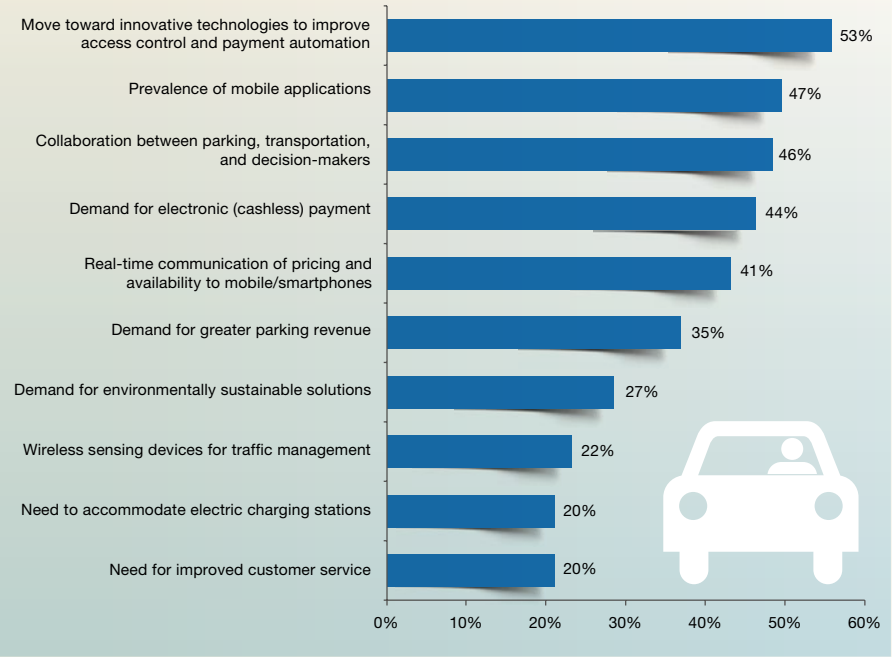
The changing demands triggered by these societal changes have broadened the responsibilities of the parking professional. Thirty-one percent of those surveyed consider themselves to be experts or very knowledgeable about transportation demand management (TDM), which involves policies and strategies to reduce congestion by encouraging alternatives to single occupancy vehicle use.

Most respondents' programs also include a variety of elements beyond parking, such as improving conditions for bicyclists and pedestrians (47 percent) and bike/transit integration (43 percent), special event management (43 percent), shuttle services (40 percent), carsharing (40 percent), park and ride (33 percent), and ridesharing (33 percent). About one quarter of all those surveyed are also involved with shared parking, commuter trip reduction programs, traffic calming, bikeshare programs, and a wide range of programs that promote alternative transportation modes.

Beyond Parking Cars

Technology Continues to Drive Parking

Top 10 Emerging Trends in Parking



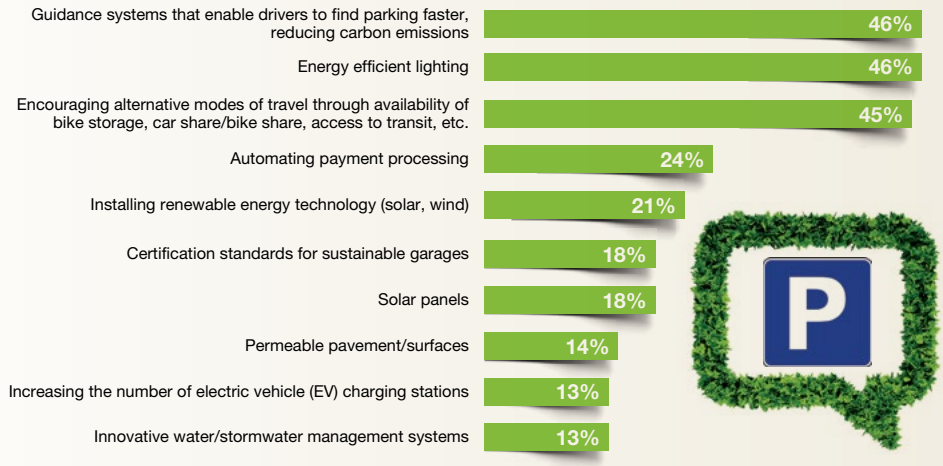
Among the top 10 emerging trends in parking, half relate directly to a range of different technologies that have revolutionized the parking sector in the past few years. Topping the list are "innovative technologies that improve access control and payment automation" (53 percent), the "demand for electronic cashless payment" (44 percent), "prevalence of mobile applications" (47 percent) and "real-time communication of pricing and availability to mobile/smartphones" (41 percent), and "wireless sensing devices for traffic management" (22 percent). Good news for parking professionals: A top trend remains greater "collaboration between parking, transportation, and decision-makers," which industry experts believe is a pathway to solving many problems.

Big Data: *About a third of parking professionals are currently using big data in their parking decisions, while 24 percent are gathering data but not yet fully utilizing it (13 percent are limited in realizing its full potential by lack of staff or other resources).*

A Focus on Environmental Sustainability

Parking professionals were also asked to identify top trends specifically related to sustainability. There was a tie for the first slot with 46 percent citing "guidance systems that enable drivers to find parking faster" (devices indicating parking spots available by level, or green and red indicator lights over parking spaces that guide drivers to open spaces), and "energy efficient lighting in parking garages," but following closer behind in third place than in past years was "encouraging alternative modes of travel through availability of bike storage, car share/bike share, access to transit, and other transportation demand management practices."

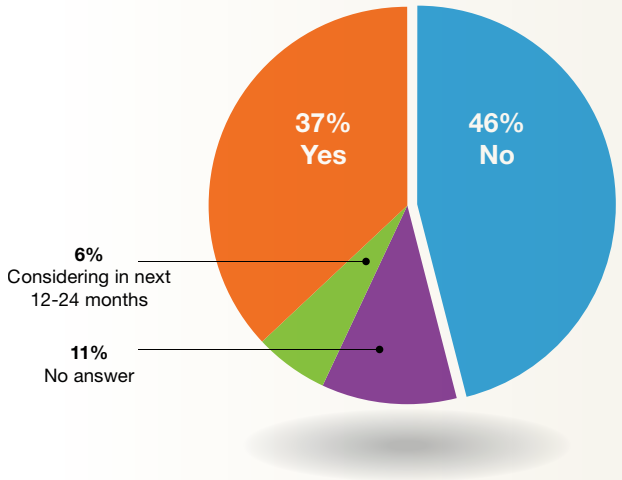
What Has the Greatest Potential to Improve Environmental Sustainability in Parking?



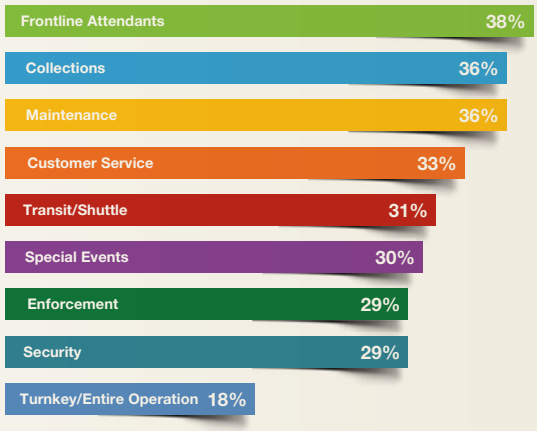
Utilization of Private Commercial/Operators

Nearly four in 10 responding parking professionals are with organizations that currently contract with commercial operators for varying services. Contracted services include frontline attendants (38 percent), collections (36 percent), maintenance (36 percent), customer service (33 percent), transit/shuttle (31 percent), special events (30 percent), enforcement (29 percent), and security (29 percent). Of those surveyed, 18 percent outsource their entire operations to a commercial operators for turnkey services.

Do You Outsource to a Private/ Commercial Operator?



What Services Do You Outsource to a Private/Commercial Operator?



Solutions for Accessible (ADA) Parking Placard Abuse

A few survey questions were designed to elicit opinions on ongoing issues facing the parking industry and its consumers, including the rampant abuse of accessible (ADA) parking placards by those without impaired mobility. Asked to rate potential measures to alleviate the problem, 62 percent of respondents recommend doing away with free placards, and nearly half (49 percent) feel the industry should work with departments of motor vehicles (DMVs) and state agencies to make placards more difficult to obtain and use fraudulently. Enforcement measures, both consistent (51 percent) and targeted (29 percent), ranked second. Only 20 percent or fewer of those surveyed believe that various education efforts would be effective in eliminating placard abuse.

How Can Accessible (ADA) Parking Placard Abuse Be Solved?

Perceptions: *Nearly half of those surveyed say that during the past five years there has been improvement in others' perceptions of the industry.*

Education May Help Reform Minimum Parking Requirements

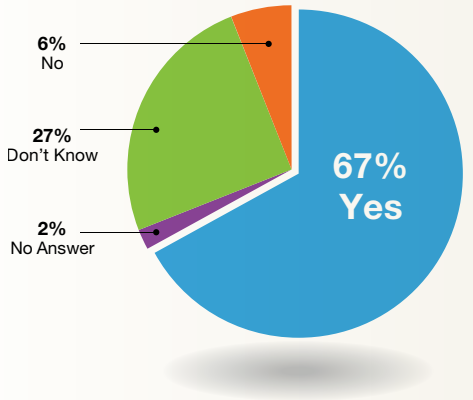
The survey also asked professionals to weigh in on the minimum parking requirements imposed by many zoning codes that can result in excess parking construction. These parking requirements create many problems for cities: they promote driving rather than mass transit; they help raise rents and displace ground-level retailers in multi-unit housing; and they hinder sustainability and beautification efforts. Half of the respondents (50 percent) agree that the city-mandated excess parking is an issue, and half feel that efforts to eliminate them or change the parking ratios have increased during the past five years. When asked to rank a list of seven barriers to reform, the top answer (32 percent) was "lack of understanding about the value of parking minimums" and, related to that, an additional 14 percent ranked "no perception that reform is needed," as a barrier. Political opposition was the number-two response (17 percent) with neighborhood opposition ranked fourth (14 percent).

Optimism for a Career in Parking

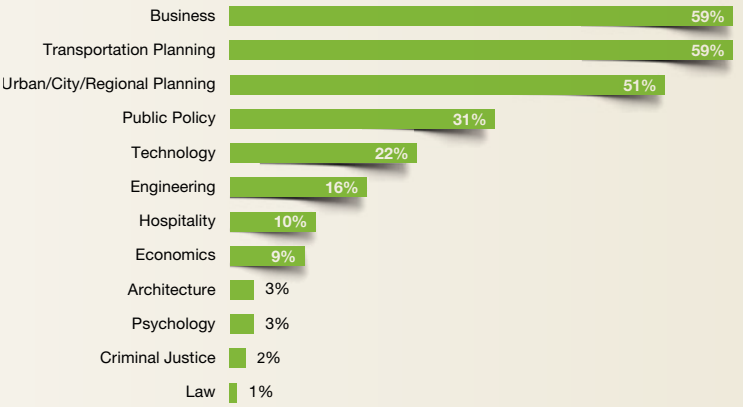
One of the positive findings illuminated by the survey was the optimistic view of the parking profession shared by most respondents. Two-thirds of those surveyed would encourage the next generation to pursue a career in parking, and only six percent would discourage it.

What advice would parking professionals give future parking professionals about an appropriate college major to begin their career path? Nearly 60 percent suggested business or transportation planning, which tied for the top spot, followed by urban/city/regional planning (51 percent), public policy (31 percent), and technology (22 percent).

Would You Recommend a Career in Parking?



What College Major is Best for a Parking Career?



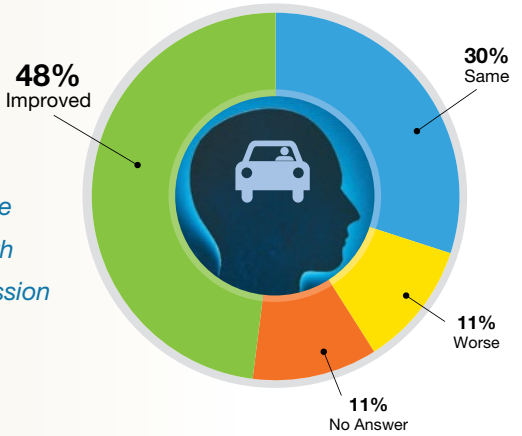
A More Positive View of Parking is Emerging

Nearly half (48 percent) of those surveyed say that during the past five years, there has been improvement in others' perception of the industry, perhaps a nod to IPI's five-year-old, industry-wide *Parking Matters®* program, which is focused on expanding awareness of the vital role of parking and parking professionals.

"It's very positive that perceptions are changing and parking professionals are seen as an integral part of the organizations and communities they serve, with ever-shifting and expanding roles and responsibilities. For those in the profession during this time of enormous change, and those entering the profession, these are very exciting times." — IPI Executive Director Shawn Conrad, CAE

Improved Perception of Parking

In your opinion, how have perceptions of parking by those outside of parking changed or remained the same during the past five years?



Survey Purpose and Methodology

The International Parking Institute (IPI), the world's largest association representing the parking industry, conducted a survey among parking professionals to determine emerging trends and solicit input on a range of topics.

The survey was conducted in early 2015 among members of the IPI and its parking communities. A link to the survey was distributed via email to IPI members, subscribers to the IPInsider e-newsletter and *Parking Matters*® Blog, and to members of IPI's LinkedIn Group. The vast majority of respondents were parking leaders, managers, consultants, department heads, and owners and operators in the United States who are involved in the parking, design, management, and oprations for municipalities, colleges and universities, airports, hospitals, retail, sports and entertainment venues, and corporations. Results were tabulated and analyzed by the Washington, D.C.-based Market Research Bureau.

This report may be downloaded at **parking.org.**

IPI INTERNATIONAL PARKING INSTITUTE™

parking.org

Municipality Parking Survey Results June 2014

- Investigation conducted exclusively for *American City & County* and the International Parking Institute.
- Methodology, data collection and analysis by Penton Research, with additional analysis by the Market Research Bureau.
- Data collected April 10 through 29, 2014.
- Methodology conforms to accepted marketing research methods, practices and procedures.
- For more information, contact Helen Sullivan, International Parking Institute, ipi@parking.org.

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OBJECTIVES & METHODOLOGY

OVERVIEW

- Investigation conducted exclusively for *American City & County* and the International Parking Institute.
- Methodology, data collection and analysis by Penton Research with additional analysis by the Market Research Bureau.
- Data collected April 10 through 29, 2014.
- Methodology conforms to accepted marketing research methods, practices and procedures.

OBJECTIVES

- Determine knowledge, attitudes and needs with regard to parking among government officials.

METHODOLOGY

- This study was conducted using an online survey methodology among subscribers of *American City & County*.
- Subscribers were invited to participate in the survey through an email.
- As with most online survey methodologies, self-selection is likely. Potential respondents were made aware of the topic of survey when invited to participate and may have chosen to take the survey based on the topic. That may result in respondents who are more interested in parking.
- Other than the potential for yielding respondents who may be more interested or involved with parking, the respondents are reasonably representative of *American City & County* subscribers which in turn represents government officials in cities/towns/ special districts and counties across the country.

RESPONSE MOTIVATION

- To encourage prompt response and increase the response rate overall, the following marketing research techniques were used:
    - A live link was included in the e-mail invitation to route respondents directly to the online survey.
    - Reminder emails were sent to non-respondents on April 15, 18 and 25, 2014.
    - The invitations and survey were branded with the *American City & County* property name and logo, in an effort to capitalize on subscriber brand affinity.

PRESENTATION OF DATA TABLES

- All percentages have been calculated on a base of respondents answering a particular question.
- Some questions allowed more than one response so table may add up to more than 100%. These situations are highlighted in the tables.
- Responses for two open-ended questions as well as any "Other" responses (i.e. those not fitting preset options) are presented verbatim.

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EXECUTIVE SUMMARY

CONCLUSION

City and county officials recognize there is a desire for livable, walkable communities, and also that traffic congestion is an issue of concern. They do not have a great deal of knowledge about new technologies in parking, but they seem interested, in fact, eager for more information, particularly on strategic planning of parking. There seems to be particular receptivity to initiatives that relate to sustainability. Respondents are motivated by serving the needs of their communities (citizens, businesses and visitors) and recognize the customer service aspect of parking and the need for educating the public. Open-ended responses indicated that case studies and information provided based on population size would be of interest to these respondents.

OBSERVATIONS

- ***City and county officials have a strong interest in learning about solutions and opportunities for parking in their communities.*** Responses to a number of questions show that there is a need for basic knowledge and guidance on parking. When asked which topics are of most interest to learn more about (choosing from a list) the highest response was developing a parking strategic plan (selected by 51% of those answering the question). The next highest was Public Outreach with a much lower level of response – 27% (which is relevant to the next observation on customer service). Parking technologies, prioritizing and regulating multiple competing demands (this is related to strategic planning as well) and incorporating sustainable parking practices round out the top five topics of interest to respondents. Only 30% have conducted a parking study in the last 5 years and 12% have never conducted such a study. And an additional 22% did not know if/when a study might have been conducted.

- ***Meeting the needs of their citizens/customers is important to these officials.*** Customer service emerged in response to several questions. Increased citizen satisfaction (38%), business customer (39%) and visitor/tourism access (28%) were the top three reasons that these respondents would consider reviewing/expanding/updating their parking program. Improvement of the customer experience also emerged as the most important factor in supporting the use of advanced technologies – 80% indicated that it was important, with 42% saying it was very important. Increased business/retail interest or cooperation (also a customer service related consideration) was the second most important with 77% indicating it was important (38% very important).

- ***The need for improved customer service and collaboration between parking, transportation and decision makers are the top trends having the most impact on their government according to respondents.*** From a list of sixteen trends provided to respondents, 31% selected this option. The second highest (at 21%) was collaboration between parking, transportation and decision makers.

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- ***Respondents are interested in case studies, best practices and benchmarking to help them understand parking issues in the context of their own communities.*** Two open-ended questions yielded involved, detailed responses (suggesting strong engagement on the part of the respondents). Many requested information that would help them understand their parking issues better. These respondents want to understand how their own communities might compare to the experience of others across the country. In addition, knowledge of how other cities of similar size benefitted from advanced technologies was the third most important factor in supporting the use of advanced technologies with two thirds (66%) indicating that it was important (20% indicating very important). Case studies were mentioned by a number of respondents as a way to provide insight into their own parking situations.

- ***There is only limited knowledge of the way that different technologies can address parking issues.*** Four in ten respondents (44%) indicated that they were dissatisfied with their use of technology in general. More than half (55%) indicated their city or county did not use any of thirteen technologies listed in the survey. The highest level of familiarity with these technologies was for entrance/exit gate technology with 58% indicating they were familiar (42% not familiar).

- ***There is interest in sustainability/green technology as it relates to parking.*** About two thirds (68%) indicated that incorporating sustainability initiatives was very or extremely important. A similar number (65%) indicated that being recognized as "green" was important to their communities. And three quarters (74%) of those that have off-street parking garages are interested in gaining "green"/sustainable certification for those garages.

# # #

Note: Responses to "other, please specify" and open-ended questions are provided unedited for spelling, typos or punctuation. Where responses would identify a respondent based on geography or jurisdiction, blank spaces are indicated, or deletions that did not alter the intent of the answer were made.

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FINDINGS

I. CONTEXT/ATTITUDES TOWARD PARKING

Which of the following topics are of the most interest to you or your organization to learn more about?

(Select up to 3 topics.)

Developing a Parking Strategic Plan	51.2%
Public outreach (enhanced education and communication via marketing, traditional media, social media, signage)	27.2%
Parking technologies (pay by cell, license plate recognition, etc.)	23.6%
Prioritizing and regulating multiple competing demands for curb space	22.4%
Incorporating more sustainable parking practices	19.7%
Parking facility restoration (restoration vs. build)	17.7%
Shared parking (building fewer parking spaces than required by each separate land use because of time of day usage).	17.7%
Residential permit parking	16.5%
Transportation demand management strategies (e.g., pay in-lieu of parking, transit benefits, park-n-ride, carshare)	14.2%
Parking maximums (addition or institution of parking maximums)	9.4%
Parking minimums (elimination or institution of minimums)	7.5%
Variable/progressive pricing (pricing that fluctuates based on demand)	7.1%

Percents may reflect multiple answers

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Which societal changes are having the most significant influence on parking in your city or county?

(Select up to 3 items.)

Desire for livable, walkable, communities	47.2%
Traffic congestion	36.2%
Aging population	30.3%
Concerns about safety	24.5%
Gasoline prices	17.6%
Desire for more aesthetic design	17.2%
Use of bicycles for commuting and build-out of on-street bicycle networks	15.5%
Focus on environment/sustainability	14.5%
Increase in mass transit use	11.7%
Migration to urban areas	8.6%
Reduced vehicle ownership patterns in younger generations	2.8%
Alternative fuel vehicles	2.1%
Other	12.4%

Percents may reflect multiple answers

Others listed:

- Ability to get to shops and eating establishments
- bigger buildings subdividing for multiple business
- Boost in economic development downtown.
- Business influx to urban area
- courts in session
- Decreased municipal revenue affecting staffing to enforce and potential to invest in new technology
- Downtown maintenance
- Downtown revitalization *(2 mentions)*
- Economic development
- Economic development--new businesses
- Improve downtown activity and traffic.
- Increased student housing close to University
- Increased tourism visits
- Local government is the only reason for public parking and existing space accommodates the current need
- migration to rural areas
- N/A *(5 mentions)*
- Need for better use of urban land for housing (<1% housing vacancy rate in community)
- Need for more Parking
- No impact on parking
- None *(3 mentions)*
- Not currently an issue
- Not sure
- Suburbanites and merchants that want parking downtown everywhere.
- Tension between (primarily younger) residents who want urban, car-free lifestyle and (primarily older) residents who view auto-mobility as a good
- Tourism increases
- Transition back to small business on 'Main Street'
- User's Cost
- We are a very small county of 4,000 population

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Which of these parking or traffic-related trends are having the most impact on your government?

(Select up to 3 items.)

Need for improved customer service	30.8%
Collaboration between parking, transportation, and decision makers	21.0%
Demand for greater parking revenue	18.0%
More Public-Private partnerships	13.4%
Need for improved visual aesthetics of parking facilities	13.1%
Demand for cashless or electronic payment	11.5%
Demand for green/sustainable solutions	10.2%
Need to improve facility security	8.9%
Alternate use of parking facilities during off-peak hours	7.9%
Shortage of qualified employees	5.6%
Need to accommodate electric car charging stations	5.2%
Move toward innovative technologies to improve entrance/exit gate automation	4.3%
Real-time communication of pricing and availability to a mobile device	3.6%
Use of wireless sensing devices for traffic management	3.6%
Demand for "visual dashboard" parking info systems	.7%
Demand for robotic/automated parking	.3%
None of these	29.5%
Other	6.6%

Percents may reflect multiple answers

Others listed:

- Conflict between need to accommodate parkers and desire to increase use of public transit
- demand for more parking
- Demand for parking due to increased economic development downtown.
- Disconnect between demand and ability/willingness to set prices to ensure availability
- Don't know.
- encroaching development
- Finding increase parking to serve small physically constrained downtown
- Free Parking for User Groups (Disabled, Veterans, Senior Citizens, etc.)
- I don't know
- Increasing traffic congestion
- Municipal revenue and law that diverts all parking revenue away from the city to the school system
- NA *(2 mentions)*
- Need for more parking
- Need more downtown parking
- Repairs to aging structures
- Rural safety
- Small town - just performed a study for Downtown Revitalization and looking into this
- Vehicle ownership drops in younger generations
- we do not operate any parking programs

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Select the most important reasons that you might consider reviewing/expanding/updating your current parking program?

(Select up to 3 reasons.)

Improve business district customer access	39.1%
Increase citizen satisfaction	37.5%
Improve visitor/tourism access	27.8%
Boost economic development	22.7%
Increase revenue	21.1%
Improve community	19.7%
Encourage development	17.4%
Manage congestion	13.0%
Enhance security	12.4%
Better use of urban land	7.7%
Improve mobility	7.4%
Increase sustainability	7.4%
Manage/improve data/analytics	6.4%
Desire to improve transportation mode split	3.7%
Ensure compliance with environmental regulations	2.7%
Other	9.4%

Percents may reflect multiple answers

Others listed:

- Accommodate employee parking demand
- don't have any parking garage in our county
- don't have parking
- Has been in process for the last 2 years
- I am not involved
- If we ever started a parking program
- improve ADA compliance
- keep tractor trailers from parking on public streets
- N/A *(5 mentions)*
- no need to update parking
- No parking
- No Parking Needs
- No parking payment system is used
- No problems; very rural
- None *(4 mentions)*
- Not my area of expertise.
- Regulate parking of boat trailers in limited space area
- We would need downtown commerce or residential development

When did your local government most recently conduct or commission a parking study or comprehensive parking program review?

Within the past year	10.2%
1 to 2 years ago	10.2%
3 to 5 years ago	9.6%
More than 5 years ago	12.4%
Never did such a study	11.5%
Plans are in place to do this year or next year	1.9%
Plans are in place to do within next 3 to 5 years	.3%
No plans at this time	19.9%
Don't know	21.7%
Other	2.0%

Others listed:

- Doing it right now.
- In progress now
- NA *(3 mentions)*
- Never
- Parking regulations are in Village Code.

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How satisfied are you with each of the following elements in your parking program?

(1 – Very dissatisfied, 2 – Dissatisfied, 3 – Satisfied and 4 – Very satisfied)

	Mean	*Median*	*Std Error*
Customer service	3.00	3.00	.04
Enforcement	2.87	3.00	.05
Availability	2.87	3.00	.05
Location	2.99	3.00	.04
Price	3.06	3.00	.05
Condition of structured parking	2.83	3.00	.05
Condition of parking lots	2.76	3.00	.05
Technology use	2.54	3.00	.05
Electric vehicle charging stations availability	2.35	2.00	.06
Parking as an element of community sustainability	2.61	3.00	.05
Zoning regulations related to parking	2.77	3.00	.04
Using data to make decisions	2.69	3.00	.05
Parking policy and/or incentive programs	2.61	3.00	.05
Safety and security	2.97	3.00	.04

Distribution of responses:

Customer service	
Very Dissatisfied	3.5%
Dissatisfied	10.1%
Satisfied	69.6%
Very Satisfied	16.7%

Location	
Very Dissatisfied	3.0%
Dissatisfied	13.5%
Satisfied	65.5%
Very Satisfied	18.0%

Enforcement	
Very Dissatisfied	6.5%
Dissatisfied	14.6%
Satisfied	64.4%
Very Satisfied	14.6%

Price	
Very Dissatisfied	5.6%
Dissatisfied	11.3%
Satisfied	54.4%
Very Satisfied	28.6%

Availability	
Very Dissatisfied	5.2%
Dissatisfied	20.2%
Satisfied	56.6%
Very Satisfied	18.0%

Condition of structured parking	
Very Dissatisfied	7.0%
Dissatisfied	17.8%
Satisfied	60.6%
Very Satisfied	14.6%

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Continued

How satisfied are you with each of the following elements in your parking program?

Distribution of responses:

Condition of parking lots	
Very Dissatisfied	5.1%
Dissatisfied	26.3%
Satisfied	56.5%
Very Satisfied	12.2%

Zoning regulations related to parking	
Very Dissatisfied	6.2%
Dissatisfied	20.5%
Satisfied	63.2%
Very Satisfied	10.1%

Technology use	
Very Dissatisfied	12.2%
Dissatisfied	31.5%
Satisfied	46.2%
Very Satisfied	10.1%

Using data to make decisions	
Very Dissatisfied	8.8%
Dissatisfied	23.7%
Satisfied	57.4%
Very Satisfied	10.0%

Electric vehicle charging stations availability	
Very Dissatisfied	22.2%
Dissatisfied	31.6%
Satisfied	35.6%
Very Satisfied	10.7%

Parking policy and/or incentive programs	
Very Dissatisfied	9.2%
Dissatisfied	31.3%
Satisfied	49.0%
Very Satisfied	10.4%

Parking as an element of community sustainability	
Very Dissatisfied	9.1%
Dissatisfied	29.2%
Satisfied	53.4%
Very Satisfied	8.3%

Safety and security	
Very Dissatisfied	3.1%
Dissatisfied	12.4%
Satisfied	69.1%
Very Satisfied	15.4%

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Two open-ended questions that address the parking context and respondents' attitudes toward parking were also asked --

- What do you consider the biggest challenges and opportunities for your city or county related to parking?

- Describe research, data, statistics, case studies, or other information about parking in U.S. cities and counties similar in size to your own, that would be the most valuable to you in making decisions about parking in your city or county?

The results of these are presented at the end of this report.

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II. PARKING TECHNOLOGY

How familiar are you with the following types of parking technology innovations?

(1 – Not at all familiar, 2 – Somewhat unfamiliar, 3 – Somewhat familiar and 4 – Very familiar)

	Mean	*Median*	*Std Error*
Entrance/exit gate technology	2.50	3.00	.06
Credit card-enabled single-space meters	2.34	3.00	.06
Multi-space pay stations/meters	2.34	3.00	.07
Enhanced security through CCTV, and advanced lighting technologies	2.25	2.00	.06
Accommodation for electric vehicle (EV) charging stations	2.20	2.00	.06
Pay-by-phone/pay-by mobile applications	2.12	2.00	.06
Mobile applications that allow drivers to find available spaces	2.10	2.00	.06
Green/sustainable solutions such as EV charging stations, solar panels, motion sensor lighting	2.00	2.00	.06
Advanced on-street parking payment options (e.g., near field communication)	1.84	2.00	.05
Systems that enhance traffic management through use of data collected by wireless sensing devices and other applications	1.84	2.00	.06
Real-time parking wayfinding and guidance systems that indicate space availability	1.83	1.00	.06
Robotic, mechanical parking (automated/stacking)	1.65	1.00	.05

Distribution of responses:

Entrance/exit gate technology	
Not at all familiar	23.4%
Somewhat unfamiliar	18.6%
Somewhat familiar	43.0%
Very familiar	15.1%

Multi-space pay stations/meters	
Not at all familiar	34.1%
Somewhat unfamiliar	15.3%
Somewhat familiar	32.8%
Very familiar	17.8%

Mobile applications that allow drivers to find available spaces	
Not at all familiar	38.2%
Somewhat unfamiliar	21.5%
Somewhat familiar	31.9%
Very familiar	8.3%

Credit card-enabled single-space meters	
Not at all familiar	32.5%
Somewhat unfamiliar	16.8%
Somewhat familiar	35.0%
Very familiar	15.7%

Pay-by-phone/pay-by mobile applications	
Not at all familiar	38.4%
Somewhat unfamiliar	21.5%
Somewhat familiar	29.4%
Very familiar	10.7%

Enhanced security through CCTV, and advanced lighting technologies	
Not at all familiar	32.8%
Somewhat unfamiliar	19.5%
Somewhat familiar	37.3%
Very familiar	10.5%

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Continued

How familiar are you with the following types of parking technology innovations?

Distribution of responses:

Accommodation for electric vehicle (EV) charging stations	
Not at all familiar	35.1%
Somewhat unfamiliar	23.2%
Somewhat familiar	28.8%
Very familiar	13.0%

Real-time parking wayfinding and guidance systems that indicate space availability	
Not at all familiar	50.3%
Somewhat unfamiliar	22.4%
Somewhat familiar	21.0%
Very familiar	6.3%

Robotic, mechanical parking (automated/ stacking)	
Not at all familiar	58.7%
Somewhat unfamiliar	22.0%
Somewhat familiar	14.7%
Very familiar	4.5%

Green/sustainable solutions such as EV charging stations, solar panels, motion sensor lighting	
Not at all familiar	40.7%
Somewhat unfamiliar	26.7%
Somewhat familiar	24.6%
Very familiar	8.1%

Systems that enhance traffic management through use of data collected by wireless sensing devices and other applications	
Not at all familiar	48.4%
Somewhat unfamiliar	25.4%
Somewhat familiar	19.5%
Very familiar	6.6%

Advanced on-street parking payment options (e.g., near field communication)	
Not at all familiar	46.5%
Somewhat unfamiliar	28.5%
Somewhat familiar	19.8%
Very familiar	5.2%

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Which, if any, of these parking technologies does your city or county use?

Entrance/exit gate technology	19.7%
Multi-space pay stations	18.8%
Accommodation for electric vehicle (EV) charging stations	14.0%
Enhanced security through CCTV, and advanced lighting technologies	12.1%
Credit card enabled single space meters	11.5%
Green/sustainable solutions such as EV charging stations, solar panels, motion sensor lighting	10.2%
Advanced lighting technologies	8.0%
Systems that enhance traffic management through use of data collected by wireless sensing devices and other applications	5.7%
Pay-by-phone parking	5.1%
Advanced on-street parking payment options (e.g., near field communication)	2.2%
Mobile applications that allow drivers to find available spaces	2.2%
Real-time parking wayfinding and guidance systems that indicate space availability	1.9%
Robotic, mechanical parking (automated/stacking)	-
None of these	54.8%
Other	3.8%

Percents may reflect multiple answers

Others listed:

- City parking is free in _____
- Full automation of parking garages
- Gate attendant-with iPhone PayWare Application for taking parking permits
- I am State employee and we pay it to the State for parking garage
- No parking charge
- None of these apply. We have no meters and parking is free with length of time 2-9 hours depending on location
- Not applicable
- Policy makers don't believe in paid parking. (Think it's bad for business)
- We are a golf cart only community. Parking is not an issue
- We don't have any off street parking
- We don't have any parking lots or fee's
- We have no paid parking in our municipality

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How important is each of the following in supporting your city's use of advanced parking technologies?

(1 – Not at all important, 2 – Somewhat unimportant, 3 – Somewhat important and 4 – Very important)

	Mean	*Median*	*Std Error*
Improvement of the customer experience	3.09	3.00	.06
Increased business/retail interest or cooperation	3.02	3.00	.06
Knowledge of how other cities of similar size have benefited	2.68	3.00	.06
More political interest/cooperation	2.58	3.00	.06
Greater familiarity with parking program options	2.56	3.00	.06
Revenue enhancement	2.56	3.00	.06
Increase in public/private partnerships	2.51	3.00	.06

Distribution of responses:

More political interest/cooperation	
Not at all Important	24.4%
Somewhat Unimportant	13.1%
Somewhat Important	42.9%
Very Important	19.6%

Knowledge of how other cities of similar size have benefited	
Not at all Important	17.4%
Somewhat Unimportant	16.3%
Somewhat Important	46.7%
Very Important	19.6%

Revenue enhancement	
Not at all Important	23.0%
Somewhat Unimportant	17.5%
Somewhat Important	40.1%
Very Important	19.3%

Increase in public/private partnerships	
Not at all Important	23.1%
Somewhat Unimportant	22.0%
Somewhat Important	35.7%
Very Important	19.1%

Increased business/retail interest or cooperation	
Not at all Important	13.3%
Somewhat Unimportant	9.4%
Somewhat Important	39.6%
Very Important	37.8%

Improvement of the customer experience	
Not at all Important	12.5%
Somewhat Unimportant	7.9%
Somewhat Important	37.5%
Very Important	42.1%

Greater familiarity with parking program options	
Not at all Important	20.3%
Somewhat Unimportant	19.9%
Somewhat Important	43.2%
Very Important	16.6%

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III. SUSTAINABILITY

How important is incorporating sustainability initiatives to your city or county?

Not at all Important	16.5%
Very Unimportant	15.2%
Very Important	57.6%
Extremely Important	10.8%

How important is being recognized as "green" to your city or county?

Not at all Important	16.6%
Very Unimportant	18.5%
Very Important	53.8%
Extremely Important	11.1%

How interested would your city or county be in gaining "green"/sustainable certification for your parking garages?
(Among respondents who own/operate off-street parking garages?)

Not at all interested	8.9%
Not very interested	16.7%
Somewhat interested	52.2%
Very interested	22.2%

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IV. PARKING AND DECISION-MAKING WITHIN THE MUNICIPALITY

Under which department(s) is parking primarily housed?

Police/Law Enforcement	33.6%
Planning and Zoning	17.8%
General Services	15.1%
Within the Transportation Department	13.4%
Within a division of Operations	11.1%
Parking as its own department	6.7%
Finance/Budget	5.7%
A Separate Parking Authority	5.4%
Economic Development	4.4%
As part of a public/private partnership, i.e. Municipality and a Business Improvement District (BID)	3.4%
Managed solely by a private entity, i.e. a Business Improvement District (BID)	1.7%
A Parking Commission	1.3%
Within a division in Environmental	.3%
Other	23.5%

Percents may reflect multiple answers

Others listed:

- appointed city council and citizens group process
- Building & Grounds or Public Works
- Building Department
- City
- Commissioners court
- Community services
- Contracted by city with professional parking company
- Department of management services with the State
- Don't enforce any parking
- Don't know.
- DPW for enforcement of on-street, DMV for adjudication of appeals and management of RPP database, Planning/Zoning only for zoning requirements for off-street parking
- Engineering *(4 mentions)*
- Engineering/Public Works
- Facilities Management
- Group of merchants own property near downtown called "____ free parking."
- Manager/Administrator's office
- multiple departments, highway, police and own
- NA *(4 mentions)*
- No department; not needed in this rural county
- No Parking
- No parking authority. No city owned parking structure
- None *(5 mentions)*
- Parking Division within DPW
- Parking is its own Division in the Public Works Department
- Parking is managed by an bridges entity and park-and-rides by mass transit dept.
- Parks Department
- Planning & Zoning/Code Enforcement
- Police dept.
- public works engineering
- Public Works Department *(14 mentions)*
- Real Property Management
- Recreation
- Small town - some parking lots and on street parking only.
- Streets
- Have a county parking lot no charge
- The Division of Parking & Traffic is in the Planning & Community Development Department
- Town Manager
- Traffic Commission
- Traffic Engineering
- We are a multipurpose entertainment complex with our own parking lot.
- We are city of <4000 and don't charge for parking anywhere in City or County.
- We do not have parking
- We don't have any parking structures, responsibility, etc.
- We have no parking
- We have no pay for parking locations in the city
- we have no public parking charges for on street or off-street.

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Select the top 3 decision-makers related to parking planning in your city or county?

(Please select only three.)

City or County Manager	56.3%
City or County Council Member	47.8%
Mayor	44.1%
Public Works Director	38.4%
Director of Economic Development	12.2%
Director of Parking	8.4%
Director of Transportation	7.5%
Business Improvement Districts or similar agencies	6.9%
CFO or Finance Officer	5.3%
Director of Roads & Bridges, Streets & Highways	4.7%
Parking Authority	4.1%
Director of Parks & Recreation	3.4%
Parking Commission	2.5%
Public/Private Entity	2.5%
Purchasing Director	1.9%
Director of Parking and Transportation	.9%
CTO or CIO	-
Director of Solid Waste, Water Services	-
Other	18.4%

Percents may reflect multiple answers

Others listed:

- Board of Selectmen
- Board of Trustees
- chamber of commerce
- Chief of Police *(8 mentions)*
- City Council *(3 mentions)*
- City Engineer *(4 mentions)*
- City Engineer; Police Chief
- City Manager
- Free Parking Group
- Code Official
- County board
- Director of Community Development
- Director of Engineering
- Director of Mass Transit
- Director of Planning & Community Development
- Director of Planning & Econ. Development
- Director of Public Services
- Director of Public Works
- Don't know *(2 mentions)*
- Downtown Association
- Downtown Development Authority
- Engineer
- Highway District
- NA *(4 mentions)*
- No one
- No Parking
- no parking plan
- Park Director
- Planning & Dev. Director
- Planning & Engineering
- Planning and zoning
- Planning Director *(3 mentions)*
- Planning Director and Police Chief
- Police Department
- Real Property Management Director
- Town Collector
- Traffic Commission, Downtown Development & Visitors Bureau
- Traffic Engineer
- University President
- we have no parking impact

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Does your municipality own/operate off-street (structured) parking garages?

Yes	26.8%
No	71.1%
Don't know	2.1%

Has your city or county increased its on-street parking rates within the past three years?

Yes	17.9%
No	75.6%
Don't know	6.5%

Which of the following best describes the reason for changing parking rates?

(Among respondents increased on-street parking rates)

Data	8.3%
Need for more revenue	46.7%
It was determined that it was time for a change	18.3%
Don't know	5.0%
Other factors	21.7%

Other factors:

- Desire to increase parking turnover and provide more "market-based" pricing
- Encourage parking in remote lots
- Funding needed infrastructure improvements
- Increase feds across the board
- Increased rate to balance demand
- Internal consistency
- Limited Parking Spaces-Boat/Trailer Parker
- Market demand
- Need for revenue and to change the parking culture
- Need to dissuade use (some facilities); and to generate revenue to cover expenses (other facilities)
- Needed more downtown parking.
- Performance parking pilot programs were established in 2008 in three high-demand areas (including around our new ballpark). Rates vary to be responsive to demand. In 2012 this was expanded to a 4th neighborhood. Meter rates in other parts of the city have been constant since 2010.
- To encourage walking, mass transit, and carpooling

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V. RESPONDENT CHARACTERISTICS

Which one of the following most closely matches your title or job function?

Department Head (or delegated division director)	15.1%
City or County Councilmember/Commissioner	12.1%
City or County Manager	11.8%
Engineering, Technical, R&D	7.3%
Public Safety (Police or Fire)	7.3%
Public Works Director	6.9%
CFO/Treasurer	6.6%
Mayor	6.6%
Economic Development Director	1.2%
Purchasing Director	1.2%
Other	23.9%

Others listed:

- Administrative Assistant *(2 mentions)*
- Assistant City Planner
- Assistant Manager of Parking and Security
- Assistant to Village Manager/Administrator
- Asst planning director
- Asst. Director - Public Works
- Attorney to County Judge
- Banker
- Budget Analyst
- Bureau of Elections Chief
- Chairman of Parking Authority
- City Clerk *(2 mentions)*
- Codes Administrator
- Codes enforcement *(2 mentions)*
- Construction Supervisor
- Controller
- County Auditor - I don't know much about this topic
- County supervisor
- Deputy Commissioner
- Deputy Dept. Head
- Director of Community Development
- Director of Facilities Management
- Director of Planning
- District manager
- ex admin asst
- FD Training Officer
- Field Service Rep
- Finance
- Financial Management Specialist
- General Service Specialist
- HR Director *(2 mentions)*
- human resources for the county
- IT
- IT Director *(2 mentions)*
- Legislator
- Management Analyst *(2 mentions)*
- Manager
- Manager of public property
- Parking Authority Executive Director
- Parking Director
- Parking Services Manager
- Parking Strategist - Policy, Planning, Program Development
- Parks and Recreation
- PIO
- Planner
- Planning & Zoning Director
- Planning Commission
- Project Manager
- Property Coordinator
- Public Utilities Director
- Public Utilities Superintendent
- public works
- Purchasing Agent
- Real Estate Finance.
- retired city councilperson
- Senior Civil Engineer
- Senior Planning Analyst
- Special Projects Administrator
- Strategic Planning Manager
- Supt of Schools
- Sustainability Coordinator
- tech
- Town Administrator
- trainer
- transportation planner
- Village trustee
- Wastewater Manager
- zoning administrator

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What is the population of your community?

Under 50,000	63.6%
50,000 – 149,999	17.8%
150,000 – 249,999	7.2%
250,000 – 499,999	4.2%
500,000 – 999,999	3.3%
1 Million – 2.49 Million	2.1%
2.5 Million and over	1.8%

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Which of the following conferences, if any, do you attend regularly?

National League of Cities	7.8%
International City/Management Association	6.6%
Government Finance Officers Association	5.4%
U.S. Conference of Mayors	2.7%
National Association of Counties	2.1%
International Downtown Association	1.2%
None	57.0%
Other	28.1%

Percents may reflect multiple answers

Others listed:

- American Planning Association *(6 mentions)*
- APWA *(6 mentions)*
- APWA, STMA
- AR Association of Counties
- Association of Indiana Counties
- Association of Washington Cities *(4 mentions)*
- AZ League of Cities and Towns Conference
- BIAS annual conference
- Building Code Conferences
- CA Cities, Council of Governments and other local Committees
- California League of Cities *(4 mentions)*
- California Public Parking Association
- Colorado Municipal League
- Congress for the New Urbanism, Rail-Volution
- county association
- county commissioners assoc.
- Engineering Related Conferences
- Fire Marshal Association of Missouri
- Florida League of Cities
- Focus on Engineering Conferences and Classes
- GAAO summer conference
- GFOA SC
- GMIS
- IAFC, LEPA/GOHSEP
- ICCTFOA and AIC
- IL County Treasurer Assos.
- Illinois Municipal League annual conference
- Illinois Municipal League, International Council of Shopping Centers
- Indiana Association of Chiefs of Police
- Institute of Transportation Engineers
- International Parking Institute, National Parking Association, ITE
- Iowa State Association of Counties
- IPI
- Law Enforcement Coordinating Committee
- league of municipalities
- League of Wisconsin Municipalities, Wisconsin Clerks Association conferences
- local government commission, California association of sanitation agencies
- Maryland Municipal Leagues
- MCMA, ASPA
- Missouri Association of Code Administrators
- Missouri Municipal League
- MML
- MN Clerk-Finance Officers Assoc; MN GFOA
- MN Clerks & Finance Officers Association
- MoCCFOA
- Municipal Information Systems Association of CA
- Municipality
- My state's municipal conference
- National Sheriff Association
- NC League of Municipalities; NC Main Street Conference
- New England Water Environment Assoc, Water Environment Federation, Connecticut Association of Water Pollution Control Agencies
- NJ Municipal Management Association, Somerset County Municipal Managers Assn
- NY State Conference of Mayors and Municipal Officials
- NJ Municipal Management Assn Annual Conference
- NYCOM *(2 mentions)*
- Ohio Municipal League *(2 mentions)*
- Oklahoma Municipal League
- Oregon League of Cities
- Oregon society of CPAs, Oregon municipal finance officers association
- planning and zoning plus state county meetings
- RI League of Cities and Towns
- rural water
- SC Association of Counties
- SCACVSO
- state court clerk conferences and meetings
- State GFOAT
- State League of Municipalities
- State level conferences...
- state managers' association and state municipal league conferences
- State mil conference. Water resource Tenn Tom waterway
- Texas Floodplain Management Association
- TX Municipal League, TX City Management Assoc., TX Downtown Association, primarily state conferences
- Various Fire Chief Conferences
- Virginia Municipal League
- Washington Finance Officers Association
- WFOA
- Wisconsin Counties Association
- Zero Graffiti International

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VI. VERBATIM RESPONSES

NOTE: Any identifying information in these responses has been removed and replaced with an underscore to ensure that respondents remain anonymous. Otherwise the comments are presented as written by respondents.

What do you consider the biggest challenges and opportunities for your city or county related to parking?

- 1. Understanding parking is not free. 2) Safety of parking decks. 3) New development could open opportunities for private/public partnerships
- Ability to continue to provide affordable off-street parking to employees.
- Accommodating parking needs spurred by recent development
- Accommodating the existing parking demands and future commitments to major employers while accounting for customer parking needs.
- ADA Compliance
- additional parking spaces are needed
- Adequate space
- All Highway Issues, we do not have parking deck or meters
- All of Main Street is parallel parking. Not enough handicap parking spaces.
- Appropriate design of parking areas.
- Availability of parking facilities
- Availability of Parking. Public/Private Partnerships to provide additional parking.
- availability of parking, curb space
- Available land to provide new parking facilities.
- Available land use.
- Available space
- Available space to accommodate parking spaces/structures.
- Balancing the needs of rail commuters with those of the rest of the community including employees and retail parking.
- Better use of existing spaces
- better use without trying to gouge users
- Biggest challenge is the need for more parking downtown and getting from where there is parking to downtown safely.
- Biggest challenge: We have enough parking, but it's in the wrong place based on people's willingness to walk. Opportunity: We are beginning a growth cycle that has made the need for parking much more visible and pushed it to the top of the agenda.
- Building structures that will allow for folks to come to the area and be able to reasonably park and have access to surrounding businesses.
- ____traffic
- Communicating how much parking is available
- Comprehensive redevelopment of downtown area into a live work play environment that is walkable.
- Concept of safety downtown.
- Constituent & decision maker education to understand shifts in trends (more affluent neighborhoods with older residents understanding actual car use & parking needs of younger residents). Education to understand how this inter-relates with transportation and housing costs (both absolutely and as a portion of household income), especially with core area <1% housing vacancy rate and lower-income workforce involuntarily relegated to housing in surrounding counties because of lack of affordable housing in core, directly related to minimum parking requirements in zoning increasing cost of adding housing units in core.
- Cooperation
- Cost
- Cost and available space demand for continued development
- Cost of engineering and construction and a suitable location.
- Cost to establish parking areas
- Cost to replace old parking meters with newer technologies and to convince the civilian governmental oversight boards that there are other options to downtown parking issues other than meters and enforcement.
- Creating a walkable, sustainable community downtown.
- day to day management, consistent policy,
- Decaying road structure
- deciding when to implement a permit parking program
- Demolition of existing parking structure, evaluation and development of a new structure, and development of an overall, strategic, parking plan.
- Developing a long term parking strategy/plan.

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- Developing a plan that works for all transportation modes while serving the commercial/industrial needs of the City.
- Developing enough parking for visitors during peak vacation periods. We have the opportunity to use part of recently acquired railroad property for additional beach parking.
- Do not know
- economic development
- Encouraging sustainability and walking
- Enforcement of parking restrictions
- Enough parking spaces
- Finances
- Finding and space in high tourist time periods. Directing tourist to parking options.
- Finding suitable locations for parking facilities
- Finding the balance of demand for the revenue that Parking produces and the need to perform the maintenance (money needed) to keep the on-going revenue stream.
- Finding the fastest way to pay for parking without standing in lines. Monthly permits, pay by phone, etc.
- Finding the space to develop more ground parking.
- Fixing portholes.
- Funding garage upkeep. Coming to an amenable solution for downtown parking district - businesses, users and City. Who pays what? Who enforces if businesses pay? What will shoppers/visitors prefer or be willing to pay?
- funding of new parking initiatives
- Funding to maintain/improve parking lots
- Garage maintenance; people refuse to walk more than 2 blocks for parking
- Getting consensus for the beach and tourist areas
- Getting employees to park further away from their place of employment to allow customer better access
- getting parking where people want it
- Getting people to leave their cars at home and taking transit.
- Have a modern safe parking structure
- Having sufficient revenue to fund the capital requirements for maintenance.
- Having the right amount in the right place
- Horses
- I don't know
- Improve Citation Management for better collection of delinquent parking citations. The goal is to have compliant parking with the parking rules by making payment options easier and reduce the number of citations issued.
- Improve parking lots.
- In our community walking more than 400 feet from your car to the store is a long walk.
- Increasing need for more parking due to downtown redevelopment
- inexpensive parking
- Infrastructure deterioration
- Keeping parking facilities in good repair (i.e., no potholes, cracks, etc.)
- Providing adequate signage to direct drivers to the facilities
- Keeping up with developing technology
- Keeping up with downtown development and boosting further development. Parking access and information is cited as the 3rd largest problem with downtown access after homelessness and security.
- Lack of available parking and disinterest by elected officials to remedy that.
- lack of available parking and lack of area for creating additional parking especially in down town area
- Lack of funding to build and maintain parking facilities
- lack of parking slots
- Lack of parking space...continued people parking in violation of city signage.
- Lack of space.
- Lack of visioning, Lack of knowledge related to being green & the benefits for the community
- Large numbers of students who travel to the University every day
- limited land and continued growth of commercial/retail activities
- Limited parking spaces during peak times. No current fee for curbside parking. No parking garage structure currently, but study completed for future review of possible garage. Structure. Need better signage, but sufficient parking for now.
- Looking forward and promoting growth within our downtown and with this also looking at upgrading and locating available parking areas.
- Maintenance
- Making sure that there is enough parking where it is needed
- Meeting the State of_____green initiatives
- Merchant and politician belief that on-street parking must be free or businesses will suffer
- money open space
- More parking
- more parking garages
- NA *(4 mentions)*
- Narrow streets and highways
- Need for revenue, but lack funds to invest in monetizing the asset more fully
- Need more on street parking spaces
- Need to simultaneously reduce excess demand for scarce CBD parking without diverting visitors and businesses away from the core. Huge opportunity to eliminate free parking and begin more comprehensive charging to improve transit mode split.
- No challenges.
- No Parking
- No real problems. Maintenance of infrastucture.
- No significant challenge at this time
- None *(4 mentions)*
- None at this time *(2 mentions)*
- Not enough available spaces during certain times, particularly when court is in session.
- Not enough money to improve our existing lots, lack of awareness of the wealth of parking opportunities in the community.
- Not enough parking downtown.
- Not enough parking spaces

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- Not enough public parking
- Not enough space. The battle between Residential and non-residential is ongoing.
- On street advancements will allow the city to address access and parking challenges
- On-street parking and loading activities in Seattle are under constant pressure as part of active right-of-way management, in terms of deciding how to implement transit, auto and bicycle improvements within a tight, planned out city. Maintaining data and managing increasingly complex parking technology as well.
- Opportunity: Free Parking; Challenge: Funding Parking Enforcement with no pay-to-park on-street facilities
- Our biggest challenge concerns small rental property off-street parking. 60 % of our properties are rentals and the on street parking demand causes friction with homeowners.
- our CBD is very restaurant intensive--managing the simultaneous demand of employees and patrons makes for high peak demand at some periods and plenty of slack at other times
- Our challenge is embracing innovative technology. Such as electronic payments: credit card meters, paying parking citations online. By embracing innovative technology the city can turn existing parking issues in to sustainable solutions, efficiency, revenue-generation, and customer service.
- Our city is growing and developing but we are a small community of approximately 7,000 population. We have limited areas for parking and we need additional space to accommodate the need for parking. This is particularly true in our downtown area.
- Our historic business district is located in the center of our town. This is also heavily residential with row houses and limited off street parking opportunities. The residents have nowhere to park when people come in to town to patronize the businesses and restaurants in this section of town.
- Outreach and education on upcoming changes
- Parking availability in the right locations! We have available downtown parking but it is not always near the need or perceived need.
- parking demands that come from extensive growth.
- Parking in downtown
- Parking is not an issue in Bossier Parish
- Parking revenues and restoration/construction of new facilities
- Perception of there not being enough parking in downtown area
- Perception that there's not enough parking spaces
- Pleasing everyone! Creating additional parking lots and/or spaces for handicapped citizens. Clearing of snow from sidewalks and curb areas during and after heavy snowstorms. Discouraging employees from parking on street taking spaces for customers and clients.
- Professional Parking enforcement officers, Customer service issues
- Proper enforcement of existing parking regulations
- Providing adequate parking stalls/spaces for our business district in the downtown. Limiting parking times, and investigating a source of revenue to support infrastructure maintenance/improvements related to parking lots and multi-level parking structure.
- Providing available parking for our residents as well as our business districts.
- Providing parking space during special events that draw large crowds and shuttle service to assist those special needs individuals that require transportation from the parking area to the venue.
- Providing the right level of parking to stimulate economic growth in the city while also fostering walkability.
- Public Acceptance *(2 mentions)*
- public's misconception that there are not enough parking spaces
- Real estate costs.
- Refurbishing aging parking structures
  Instituting parking pricing
- Replace our City Manager
- resurface parking lot
- Revenue
- revenue versus convenience
- Safety & Security.
- Satisfying the competing interest
- Seasonal use
- Security
- Sharing parking areas with other uses such as special events or farmer markets
- Signage and way-finding to lots for tourists; and adding more spaces close-in to downtown.
- Size of our streets. Very small 4th class city. Infrastructure program underway to redo streets to standard width and storm water sewers.
- Small downtown with limited parking
- Space *(6 mentions)*
- Space - parallel parking vs. diagonal
- Space and easy access.
- Space and money
- Space and the ability of any of the governing heads to agree on anything.
- Space for parking
- Staffing and available spaces
- state road as main st
- Surface parking in downtown area taken up by non- retail customers leaves inadequate parking to support retail/entertainment/dining business during weekday, day time hours.
- The biggest challenge to our city is outdated parking facilities and streetscape design. A majority of our off- street parking facilities are large outdated parking lots. There is no integration of design.
- the environment
- The future growth of the downtown with its effect on the ability to fund parking structures and keeping pace with technology.

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- The greatest opportunities are the city's support of multimodal forms of transportation, thus the understanding of the need for additional park-and-rides throughout the city.
- The lack of space available to create parking
- The number of parking spaces. The allocation and use of public versus employee.
- The only parking control used to be in the downtown area. About 5 or so years ago, the parking garage was tore down and free parking was encouraged for downtown business participation.
- There are no city owned parking meters or parking structures in _____
- This is not an issue here except during special events.
- too much is required for commercial construction
- Traffic
- Traffic flow and the lack of space to park vehicles. This in turn makes it difficult for large vehicles to get around in certain places of our town.
- Transit oriented development around light rail stations.
- Transitioning from a small town to a larger City. Our City wants to maintain its small-town charm, but begin to provide for innovative, green, pedestrian friendly areas. However, certain businesses don't want to give up their front-door parking. And, certain elected leaders don't want to accommodate anyone but their buddy. They are incapable of taking a holistic few of meeting the needs of the entire City.
- Trying to encourage the use of sustainable modes of transportation by providing EV and bicycle parking opportunities throughout the city.
- Unfortunately we have no issues - our population is 372.
- Updating parking requirements to reflect new technology, such as telecommuting, on line purchasing.
- Upgrading and maintaining facilities
- Using existing spaces more efficiently.
- We are a built out city and have a lack of space in the downtown area/beach parking
- We are a built-out City, many building were built without on-site parking. That is a major challenge. As for opportunities, we need to take greater advantage of private parking resources.
- We are a destination resort community so our parking issues are quite a bit different from a non-destination location.
- We are a small city of under 9,000. Most of the issues mentioned in the survey do not apply to us. But our contracted budget has eliminated a person to mark DT parked cars for length of stay, and our DT business (non-retail) owners tend to take up spaces all day. We have no resources to institute meters or some type of pay system, and current state statutes direct revenue from enforcement to the school system - a county function. Ergo - we have no real resources with which to effect a change for the better.
- We are still a rural county and parking does not seem to present a challenge.
- We do not have parking challenges.
- We have 3 Colleges, so our population fluctuates but need parking in downtown area for visitors and students.
- We have an excessive amount of parking based on usage, but the general public does not think there is enough.
- We have none
- We have one of the longest-running RPP programs in the US, but it has evolved to the point that it is under serious pressure. Residents and policymakers have placed too many competing demands on the system. We have an opportunity to reform RPP to be more locally-focused on providing access to smaller geographic areas around a residence, which would be popular with large segments of the population. But it would upset enough people that decision makers have stopped short of implementing reforms. We also face increasing demands on curbside space for other uses (bike lanes, car share, loading, and perhaps soon transit lanes). The numbers are on the side of using that valuable public space for greater access and mobility than car storage can provide, but we have not yet made an effective case for serving people over cars (particularly among businesses who perceive curbside parking as essential to their customer base). We are poised to greatly increase demand/availability- based pricing, but lack of consistent leadership, staff turnover, and competing priorities have presented barriers. Finally, concerns about spill-over have delayed efforts to reform minimum parking requirements. We need commercial and residential development in our downtown area to create a need for public/private parking.
- We need to make it easier for people to pay and offer options.
- Weak public transit system and perception that parking must be from front door to front door
- Weather. No matter what any outside consultant says, when the air temperature is over___degrees (and the ground temperature can be in excess of____degrees), no one wants to walk more than a few feet to get inside an air conditioned building. What will work in____, will not work in_____or _____.
- With today's economy bigger buildings in our downtown area are subdividing making multiple businesses requiring additional parking needs in our downtown business district.
- Without adequate parking consumers will not support a business or facility.
- Workers parking in down town area.
- working together

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Describe research, data, statistics, case studies, or other information about parking in U.S. cities and counties similar in size to your own, that would be the most valuable to you in making decisions about parking in your city or county?

- Effective use of space for parking
- ??? I'd have to ask our Parking Division manager, it's all intriguing to me
- A study that includes the cost of operating a shuttle service for special events with ideas on sponsorships to fund the cost of shuttles.
- All of it.
- Anything
- Anything that addresses the issues I mentioned in the paragraph above. Small down towns that are struggling to maintain a retail base, with increasing state legislation affecting our revenue streams have no resources to change infrastructure or system management b/c the pay-off time would be so extended if at all (not to mention the competition of parking investment with public safety etc.).
- at this time n/a
- Average number of parking spaces for a similar size city.
- Best practices regarding parking in a University community and encouraging students to take public transportation
- BMP for storm water
- Case studies are always helpful.
- Case studies of effective efforts to reduce RPP zone sizes, reform/establish visitor parking permit programs, and reform RPP to more restrictive models (increased pricing, requirements to prove lack of off- street space, flexibility to restrict certain blocks/addresses from access to RPP).

  Data showing importance of transit/bicycle access vs. curbside parking access to economic success of commercial districts.

  Case studies or peer-learning on how to effectively regulate/manage privately owned parking as art of a PPP or coordinated strategic parking plan (including shared parking).

  Data or case studies demonstrating benefits of (and lack of harm created by) removing parking minimums and/or establishing maximums.

  Case studies or peer-learning on effective management of parking benefit districts (with demand- based pricing) and TDM strategies. And frankly, we need to know how these programs are staffed - we have plenty of information on the customer experience and the infrastructure benefits, but we appear to lack the staff know-how to effectively manage these programs or to navigate political challenges to them.
- Case studies on downtown revitalization
- case study of a similar sized town implementing a complete residential permit parking system census and number of vehicles traveled on high way
- Cities with similar growth increases
- Collections rates and processes/practices. Off-street facilities operational hours.
- Data & Case Studies
- Data on typical hours of on-street meter operation, data on handicap placard abuse, data on successful programs to eliminate non-resident parking in residential neighborhoods.
- Data supporting mode split changes based on instituted pricing and other TDM strategies. Improvements to traffic congestion as a result of pricing systems
- Data that corresponded to similar-sized beach communities and how they provide for temporary/transient parking.
- Difficult to find. Important criteria are size of community, density patterns, demographic patterns (student presence), transit service level. Would be more interested in information about approaches to trying new policies, for instance, ways to shift course if necessary, ways to measure effectiveness after shorter time frames, potential criteria to use to measure effectiveness.
- Do not know at this time.
- Don't know *(3 mentions)*
- Don't really know at this point.
- During research I contacted_____and_____to inquire about their single-space credit card meter._____Security Director in ____, stated since installing the credit card meters, they have seen a 20% increase in revenue. During my research I found where_____has began to use the smartphone app, which makes it easier to pay downtown parking fees.
- Free vs. paid parking in small communities
- Green parking strategies
- How communities have developed strategic parking plans and the options that they have used to deal with parking issues.
- How many towns/cities have metered parking or time restrictions similar in size to our city.
- How other communities handle parking
- How others cities are structured regarding as to who manages the Parking Enforcement department, or administrative law enforcement departments.
- How they deal with it in the downtown areas and how they use the money to reinvest.
- How to reorganize an old public square for traffic and parking
- I am unaware of any studies that would compare our town to any other town our size. I am aware of traffic rates on our streets during the day time hours and the night time hours.
- I moved to this area about 2 years ago from a much larger community and just looking into our decisions regarding parking. Currently, the City has ample parking; however at the same time promoting growth and looking vigorously at additional parking needs.
- I typically review articles relevant to parking meter strategies, and how communities our size handle parking in similar sized downtown atmospheres. The largest challenge we deal with is business owner's wanting curbside parking available for customers while most workers utilize the parking available for customers. Vicious cycle of wants and needs.
- Ideal parking vacancy rates, maximum and minimum parking demands for various land uses.
- ideas from other small cities.....we are a population of less than 3,000

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- Impacts of state highway policy, parking policy templates.
- Information about parking in standalone (non-suburban) cities of similar size
- Information from cities with same demographics.
- Information regarding parking for complete streets and how other cities are funding EV charging/parking stations.
- Information specific to parking systems and technologies to serve visitors and parking during peak visitation demand periods.
- Issues with storm water run off. Our city floods frequently and more asphalt surfaces create drainage problems. Our city is under 10,000.
- It has never really been an item that they talk about.
- ITE Parking Generation Manual
- NA *(15 mentions)*
- New construction for new/revitalized mixed use Downtown.
- No Parking
- None *(6 mentions)*
- None available at this time
- none I am not involved
- none we have enough free parking
- not aware
- not aware of what is available for a community our size
- Not familiar with these studies
- not familiar
- Not sure.
- Not too much info needed.
- Number of parking spaces, time limits, issuance of parking passes, fines and enforcement practices.
- Other cities have been researched; the political will is not there to model other cities.
- Parking fees. Public-private partnership. Number of spaces. Cost of structures.
- Parking Management Programs used by other cities.
- parking operations as it relates to on street management i.e. pay stations, pay by cell. management of parking i.e. wireless handheld ticket writers and how to boost revenue
- Parking options along with transit oriented development
- Parking pricing studies
- Parking studies in similar sized entities
- Parking variables that correlate to economic development
- Permit and metered parking rates, downtown parking density, parking enforcement tools for customer parking.
- Pricing, innovation producing cost effective results, data gathering tools
- really not sure without some study
- Research conducted on advanced technology and the development, operations and maintenance of parking lots, street parking, and parking garages.
- Research from similar sized cities with transit development.
- Research that shows what an appropriate amount of parking a traditional urban downtown needs in relation to population and business use would be helpful.
- Revenue stream & subsidy comparisons for both pay- to-park communities and free parking communities
- Same economic status is important
- ____considers itself unique but we have always been open to new ideas in parking. We are currently doing an organizational assessment of our staffing and operations. With this in mind I think that parking conferences and electronic networking is the most helpful.
- _____conducts an on-street parking study in all paid parking areas (total 12,000 paid spaces, we count 3/4 of them) as part of our Performance-based Parking Pricing program. Having access to similar studies, particularly from municipalities, would be helpful. Research on the effects of variable pricing for on- street parking programs would be great too. Curb space policies, strategic parking plans from larger cities too.
- shared parking, storm water management
- Similar business districts before and after right-priced parking implementation.

  Examples of initiatives funded by parking revenues.
- Street parking versus structured parking. Ability of the City or the Economic Development Authority to own and/or manage parking.
- Street/other options for notifying, informing the transient tourist community of parking options
- Studies of comparable cities in the US
- Technologies, building parking areas and structures, security.
- The effects of summer tourism on available parking.
- The trends that indicate that car use is declining amongst "Millennials".
- Unknown *(3 mentions)*
- Unsure
- Use of park and ride locations away from urban centers and transportation of users to urban locations
- Use of permeable paving options to create more multi- use spaces.
- We are a small county of less than 5000 so I don't know if this would work but would consider a study.
- We are a very rural County. Low population, little mass transit. People that visit the campus often drive long distances.
- We are currently in a parking study specific to the Village of ____. Helpful would be projected studies for future requirements for local area as well as Federal studies and sources for new parking structures with federal/state funds available for green" structures.
- We have a very unique city.
- We really don't have parking issues.
- What other similar size counties are handling parking.
- Would be interesting to see how smaller towns and villages are dealing with parking conditions.

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2013 GLOBAL PARKING SURVEY

Report on Surveys Conducted by the Global Parking Association Leaders

GLOBAL PARKING ASSOCIATION LEADERS SUMMIT

2013 DUBLIN

Presented at 16th EPA Congress
September 11, 2013

What is GPALS?

GLOBAL PARKING ASSOCIATION LEADERS SUMMIT

2013 DUBLIN

The Global Parking Association Leaders Summit (GPALS) is an annual gathering of parking association leaders from around the world. Established by the International Parking Institute in 2012, the GPALs Summit is a unique opportunity for those leaders to gather, share information, and learn from each other in a friendly forum that encourages discussion and dialogue on a wide range from topics.

17 GPALs Associations

1 Parking Association of Australia Inc.
2 Parking Association of Brazil (Abrapark)
3 The British Parking Association
4 Canadian Parking Association
5 Croatian Parking Association
6 European Parking Association
7 Finnish Parking Association
8 German Parking Association
9 International Parking Institute
10 Irish Parking Association
11 Israel Parking Association
12 Italian Parking Association (AIPARK)
13 Japan Parking Association
14 New Zealand Parking Association
15 Norwegian Parking Association
16 Parking Association of Spain (ASESGA)
17 Swedish Parking Association

13 Survey Participants

1. Parking Association of Australia Inc.
2. Parking Association of Brazil (Abrapark)
3. The British Parking Association
4. Canadian Parking Association
5. European Parking Association
6. Finnish Parking Association
7. German Parking Association
8. International Parking Institute
9. Irish Parking Association
10. Japan Parking Association
11. Norwegian Parking Association
12. Parking Association of Spain (Asesga)
13. Swedish Parking Association

- 13 Parking Associations
- Respondents from 21 countries
- Survey translated into 5 languages

GLOBAL PARKING ASSOCIATION LEADERS SUMMIT 2013 DUBLIN

Background

- **Based on IPI's *Emerging Trends In Parking* Survey**
  - Conducted annually – Statistically valid

- **Research subcommittee adapted for GPALs:**
  - **Keith Gavin**, Ireland
  - **Nick Lester**, EPA
  - **Patrick Troy**, UK
  - **Larry Schneider**, Australia
  - **Carole Whitehorne**, Canada
  - **Andre Piccoli**, Brazil
  - **Helen Sullivan**, USA
  - **Giuliano Mingardo**, Netherlands

Background

- **Online survey of 10 questions**
- **Each association surveyed their own members/stakeholders**
- **Fielded during July-August 2013**
- **Each country's parking association to publicize their own study results**
- **Many issues/perceptions in common; some differences**

Disclaimer

- **First year**
- **Excellent collaborative effort**
- **Individual country surveys vary widely**
- **Market research firm assisted**
- **“Snapshot,” not a statistically projectable study**

Question 1: "From the list below, please select a maximum of FIVE trends you believe are having the greatest effect on the parking industry or profession."

1 Most Impactful Trends (1 of 2)

Move toward innovative technology to improve parking management (i.e. sensor technology, mobile phones, etc.)

AUSTRALIA, BRAZIL, BRITAIN, CANADA, EPA, FINLAND, GERMANY, IRELAND, JAPAN, NORWAY, SPAIN, SWEDEN, USA

Demand for electronic (cashless) payment

AUSTRALIA, BRAZIL, BRITAIN, CANADA, EPA, GERMANY, IRELAND, JAPAN, NORWAY, SPAIN, SWEDEN, USA

Need for more collaboration between parking, transportation, and decision-makers

AUSTRALIA, BRITAIN, CANADA, EPA, FINLAND, IRELAND, NORWAY, SPAIN, SWEDEN, USA

Need for green/sustainable solutions

AUSTRALIA, BRAZIL, CANADA, EPA, FINLAND, JAPAN, SWEDEN, NORWAY

Determine parking's role and responsibilities to accommodate electric vehicles

GERMANY, JAPAN, NORWAY, SPAIN

Demand from politicians/businesses for inexpensive or free parking

BRITAIN, FINLAND, IRELAND, SPAIN

Parking taxes and levies to support sustainable mobility practices (i.e. cycling and transit)

AUSTRALIA, CANADA, FINLAND, NORWAY

1 Most Impactful Trends (2 of 2)

Need to improve facility security	GERMANY, JAPAN, SWEDEN
Move toward more public-private partnerships	BRAZIL, FINLAND, SPAIN
Resistance to enforcement operations from motorists/politicians	BRITAIN, IRELAND
Need for improved visual appeal/aesthetics of parking facilities	GERMANY, SPAIN
Parking taxes and levies to support infrastructure development	CANADA
Shortage of qualified employees	BRAZIL
Demand for more transparency about the use of parking revenue	EPA

1 Most Impactful Trends - Ranking

	AUSTRALIA	BRAZIL	BRITAIN	CANADA	EPA	FINLAND	GERMANY	IRELAND	JAPAN	NORWAY	SPAIN	SWEDEN	USA
Innovative Technology	1	1	1	1	1	1*	2	1	In top 5	2	1	1*	1
Electronic Payment	3	2	4*	2	3	-	4*	4	In top 5	2*	5*	1*	2
Need for Collaboration	2	-	2	3	2	2*	-	5	-	1	2	3	3
Sustainable Solutions	4	5	-	4	4	1*	-	-	In top 5	-	-	4	-
Accommodating EVs	-	-	-	-	-	-	4*	-	In top 5	4	3*	-	-
Inexpensive/Free Parking	-	-	3	-	-	2*	-	3	-	-	5*	-	-
Taxes for Sustainable Mobility	5	-	-	5*	-	2*	-	-	-	4*	-	-	-
Improve Facility Security	-	-	-	-	-	-	1	-	In top 5	-	-	5	-
Public-private Partnerships	-	4	-	-	-	2*	-	-	-	-	5*	-	-
Resistance to Enforcement	-	-	4	-	-	-	-	2	-	-	-	-	-
Improved Visual Appearance	-	-	-	-	-	-	3	-	-	-	3*	-	-
Infrastructure Development	-	-	-	5*	-	-	-	-	-	-	-	-	-
Shortage Qualified Employees	-	3	-	-	-	-	-	-	-	-	-	-	-
Greater Transparency	-	-	-	-	5	-	-	-	-	-	-	-	-

*Indicates a tie

1 Most Impactful Trends - Ranking

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Sustainable Solutions	4	5	-	4	4	1*	-	-	In top 5	-	-	4	-
Accommodating EVs	-	-	-	-	-	-	4*	-	In top 5	5	3*	-	-
Inexpensive/Free Parking	-	-	3	-	-	2*	-	3	-	-	5*	-	-
Taxes for Sustainable Mobility	5	-	-	5*	-	2*	-	-	-	4*	-	-	-
Improve Facility Security	-	-	-	-	-	-	1	-	In top 5	-	-	5	-
Public-private Partnerships	-	4	-	-	-	2*	-	-	-	-	5*	-	-
Resistance to Enforcement	-	-	4	-	-	-	-	2	-	-	-	-	-
Improved Visual Appearance	-	-	-	-	-	-	3	-	-	-	3*	-	-
Infrastructure Development	-	-	-	5*	-	-	-	-	-	-	-	-	-
Shortage Qualified Employees	-	3	-	-	-	-	-	-	-	-	-	-	-
Greater Transparency	-	-	-	-	5	-	-	-	-	-	-	-	-

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GLOBAL PARKING ASSOCIATION LEADERS SUMMIT 2013 DUBLIN

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Improve Facility Security	-	-	-	-	-	-	1	-	In top 5	-	-	5	-
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Improved Visual Appearance	-	-	-	-	-	-	3	-	-	-	3*	-	-
Infrastructure Development	-	-	-	5*	-	-	-	-	-	-	-	-	-
Shortage Qualified Employees	-	3	-	-	-	-	-	-	-	-	-	-	-
Greater Transparency	-	-	-	-	5	-	-	-	-	-	-	-	-

*Indicates a tie

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Resistance to Enforcement	-	-	4	-	-	-	-	2	-	-	-	-	-
Improved Visual Appearance	-	-	-	-	-	-	3	-	-	-	3*	-	-
Infrastructure Development	-	-	-	5*	-	-	-	-	-	-	-	-	-
Shortage Qualified Employees	-	3	-	-	-	-	-	-	-	-	-	-	-
Greater Transparency	-	-	-	-	5	-	-	-	-	-	-	-	-

*Indicates a tie

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Sustainable Solutions	4	5	-	4	4	1*	-	-	In top 5	-	-	4	-
Accommodating EVs	-	-	-	-	-	-	4*	-	In top 5	4*	3*	-	-
Inexpensive/Free Parking	-	-	3	-	-	2*	-	3	-	-	5*	-	-
Taxes for Sustainable Mobility	5	-	-	5*	-	2*	-	-	-	4*	-	-	-
Improve Facility Security	-	-	-	-	-	-	1	-	In top 5	-	-	5	-
Public-private Partnerships	-	4	-	-	-	2*	-	-	-	-	5*	-	-
Resistance to Enforcement	-	-	4*	-	-	-	-	2	-	-	-	-	-
Improved Visual Appearance	-	-	-	-	-	-	3	-	-	-	3*	-	-
Infrastructure Development	-	-	-	5*	-	-	-	-	-	-	-	-	-
Shortage Qualified Employees	-	3	-	-	-	-	-	-	-	-	-	-	-
Greater Transparency	-	-	-	-	5	-	-	-	-	-	-	-	-

*Indicates a tie

1 Most Impactful Trends - Ranking

	AUSTRALIA	BRAZIL	BRITAIN	CANADA	EPA	FINLAND	GERMANY	IRELAND	JAPAN	NORWAY	SPAIN	SWEDEN	USA
Innovative Technology	1	1	1	1	1	1*	2	1	In top 5	2*	1	1*	1
Electronic Payment	3	2	4*	2	3	-	4*	4	In top 5	2*	5*	1*	2
Need for Collaboration	2	-	2	3	2	2*	-	5	-	1	2	3	3
Sustainable Solutions	4	5	-	4	4	1*	-	-	In top 5	-	-	4	-
Accommodating EVs	-	-	-	-	-	-	4*	-	In top 5	4*	3*	-	-
Inexpensive/Free Parking	-	-	3	-	-	2*	-	3	-	-	5*	-	-
Taxes for Sustainable Mobility	5	-	-	5*	-	2*	-	-	-	4*	-	-	-
Improve Facility Security	-	-	-	-	-	-	1	-	In top 5	-	-	5	-
Public-private Partnerships	-	4	-	-	-	2*	-	-	-	-	5*	-	-
Resistance to Enforcement	-	-	4*	-	-	-	-	2	-	-	-	-	-
Improved Visual Appearance	-	-	-	-	-	-	3	-	-	-	3*	-	-
Infrastructure Development	-	-	-	5*	-	-	-	-	-	-	-	-	-
Shortage Qualified Employees	-	3	-	-	-	-	-	-	-	-	-	-	-
Greater Transparency	-	-	-	-	5	-	-	-	-	-	-	-	-

*Indicates a tie

Question 2: “Thinking about the benefits of sustainability to the environment, which of the following do you believe has the greatest potential to improve sustainability in parking? (Top 3 choices)”

2 What Has Greatest Potential to Improve Sustainability?

On-and-off street guidance systems that enable drivers to find parking faster, reducing carbon emissions

AUSTRALIA, BRAZIL, BRITAIN, CANADA, EPA, FINLAND, GERMANY, IRELAND, JAPAN, NORWAY, SPAIN, SWEDEN, USA

Encouraging alternative travel through availability of bike storage, car share/bike share, access to transit

AUSTRALIA, BRAZIL, BRITAIN, CANADA, FINLAND, GERMANY, IRELAND, NORWAY, SWEDEN, USA

Energy-efficient lighting

AUSTRALIA, BRAZIL, EPA, GERMANY, IRELAND, JAPAN, SPAIN, SWEDEN, USA

Increased use of transportation demand management (i.e. pricing, etc.)

BRITAIN, CANADA, FINLAND, NORWAY, SWEDEN

Installing renewable energy technology (solar, wind, etc.)

FINLAND, IRELAND, SPAIN

Facilitating electric vehicles

FINLAND, JAPAN, SPAIN

Automating payment processes

EPA

2 What Has Greatest Potential to Improve Sustainability?

	AUSTRALIA	BRAZIL	BRITAIN	CANADA	EPA	FINLAND	GERMANY	IRELAND	JAPAN	NORWAY	SPAIN	SWEDEN	USA
On-and-off street guidance systems that enable drivers to find parking faster, reducing carbon emissions	1	2	1*	1	1	1	2*	1	In top 3	2*	1*	1*	1
Encouraging alternative travel through availability of bike storage, car share/bike share, access to transit	2	3	1*	2	-	2*	2*	2	-	1	-	2*	3
Energy-efficient lighting	3	1	-	-	2	-	1	3*	In top 3	-	1*	2*	2
Increased use of transportation demand management (i.e. pricing, etc.)	-	-	3	3	-	2*	-	-	-	2*	-	1*	-
Installing renewable energy technology (solar, wind, etc.)	-	-	-	-	-	2*	-	3*	-	-	2*	-	-
Facilitating electric vehicles	-	-	-	-	-	2*	-	-	-	-	2*	-	-
Automating payment processes	-	-	-	-	3	-	-	-	-	-	-	-	-

*Indicates a tie

2 What Has Greatest Potential to Improve Sustainability?

	AUSTRALIA	BRAZIL	BRITAIN	CANADA	EPA	FINLAND	GERMANY	IRELAND	JAPAN	NORWAY	SPAIN	SWEDEN	USA
On-and-off street guidance systems that enable drivers to find parking faster, reducing carbon emissions	1	2	1*	1	1	1	2*	1	In top 3	2*	1*	1*	1
Encouraging alternative travel through availability of bike storage, car share/bike share, access to transit	2	3	1*	2	-	2*	2*	2	-	1	-	2*	3
Energy-efficient lighting	3	1	-	-	2	-	1	3*	In top 3	-	1*	2*	2
Increased use of transportation demand management (i.e. pricing, etc.)	-	-	3	3	-	2*	-	-	-	2*	-	1*	-
Installing renewable energy technology (solar, wind, etc.)	-	-	-	-	-	2*	-	3*	-	-	2*	-	-
Facilitating electric vehicles	-	-	-	-	-	2*	-	-	-	-	2*	-	-
Automating payment processes	-	-	-	-	3	-	-	-	-	-	-	-	-

*Indicates a tie

2 What Has Greatest Potential to Improve Sustainability?

	AUSTRALIA	BRAZIL	BRITAIN	CANADA	EPA	FINLAND	GERMANY	IRELAND	JAPAN	NORWAY	SPAIN	SWEDEN	USA
On-and-off street guidance systems that enable drivers to find parking faster, reducing carbon emissions	1	2	1*	1	1	1	2*	1	In top 3	2*	1*	1*	1
Encouraging alternative travel through availability of bike storage, car share/bike share, access to transit	2	3	1*	2	-	2*	2*	2	-	1	-	2*	3
Energy-efficient lighting	3	1	-	-	2	-	1	3*	In top 3	-	1*	2*	2
Increased use of transportation demand management (i.e. pricing, etc.)	-	-	3	3	-	2*	-	-	-	2*	-	1*	-
Installing renewable energy technology (solar, wind, etc.)	-	-	-	-	-	2*	-	3*	-	-	2*	-	-
Facilitating electric vehicles	-	-	-	-	-	2*	-	-	-	-	2*	-	-
Automating payment processes	-	-	-	-	3	-	-	-	-	-	-	-	-

*Indicates a tie

2 What Has Greatest Potential to Improve Sustainability? - Ranking

	AUSTRALIA	BRAZIL	BRITAIN	CANADA	EPA	FINLAND	GERMANY	IRELAND	JAPAN	NORWAY	SPAIN	SWEDEN	USA
On-and-off street guidance systems that enable drivers to find parking faster, reducing carbon emissions	1	2	1*	1	1	1	2*	1	In top 3	2*	1*	1*	1
Encouraging alternative travel through availability of bike storage, car share/bike share, access to transit	2	3	1*	2	-	2*	2*	2	-	1	-	2*	3
Energy-efficient lighting	3	1	-	-	2	-	1	3*	In top 3	-	1*	2*	2
Increased use of transportation demand management (i.e. pricing, etc.)	-	-	3	3	-	2*	-	-	-	2*	-	1*	-
Installing renewable energy technology (solar, wind, etc.)	-	-	-	-	-	2*	-	3*	-	-	2*	-	-
Facilitating electric vehicles	-	-	-	-	-	2*	-	-	-	-	2*	-	-
Automating payment processes	-	-	-	-	3	-	-	-	-	-	-	-	-

*Indicates a tie

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Question 3: "What societal changes do you believe are having the most significant influences on parking? (Top five choices)"

3 Most Influential Societal Changes on Parking (1 of 2)

Increased traffic congestion

AUSTRALIA, BRAZIL, BRITAIN, CANADA, EPA, FINLAND, GERMANY, IRELAND, NORWAY, SPAIN, USA

Increased fuel prices

AUSTRALIA, BRITAIN, CANADA, EPA, GERMANY, IRELAND, JAPAN, SPAIN, USA

Increased use of mass transit for commuting/traveling

AUSTRALIA, CANADA, EPA, FINLAND, IRELAND, JAPAN, NORWAY, SPAIN, SWEDEN

Economic pressures on retailers, particularly in main/high streets and traditional town centers*

AUSTRALIA, BRAZIL, BRITAIN, EPA, IRELAND, JAPAN, NORWAY, SPAIN

Focus on environment and sustainability

AUSTRALIA, BRAZIL, CANADA, EPA, FINLAND, NORWAY, SWEDEN, USA

Desire for more liveable, walkable communities

CANADA, FINLAND, GERMANY, IRELAND, JAPAN, NORWAY, SWEDEN, USA

Aging population

FINLAND, GERMANY, JAPAN, USA

*Not included in USA survey

3 Most Influential Societal Changes on Parking (2 of 2)

Increased migration from suburban to urban areas

BRAZIL FINLAND NORWAY SWEDEN

Concerns about safety

BRAZIL GERMANY

Increased use of bicycles for commuting/travelling

BRITAIN IRELAND

More aggressive lobbying from drivers/motorists

BRITAIN SPAIN

Increased work flexibility so parking demand is spaced out

IRELAND SPAIN

Increased number of alternative fuel vehicles on the road

SWEDEN

Desire for more aesthetic design

SWEDEN

3 Most Influential Societal Changes on Parking - Ranking

	AUSTRALIA	BRAZIL	BRITAIN	CANADA	EPA	FINLAND	GERMANY	IRELAND	JAPAN	NORWAY	SPAIN	SWEDEN	USA
Increased Traffic Congestion	1	2	2	1	1	4*	2	4	-	3*	3*	-	1
Increased Fuel Prices	2	-	3	3	3	-	3	2	In top 5	-	1*	-	2
Increased use of mass transit	3*	-	-	5	4*	4*	-	5*	In top 5	3*	3*	5*	-
Economic pressures	3*	4	1	-	2	-	-	1	In top 5	3*	1*	-	Not asked in USA survey
Focus on sustainability	5	5	-	2	4*	1*	-	-	-	1*	-	1	4*
Desire for walkable communities	-	-	-	4	-	1*	4*	5*	In top 5	1*	-	2*	3
Aging population	-	-	-	-	-	1*	1	-	In top 5	-	-	-	5
Increased migration to urban areas	-	3	-	-	-	4*	-	-	-	3*	-	5*	-
Concerns about safety	-	1	-	-	-	-	4*	-	-	-	-	-	-
Increased use of bicycles	-	-	5	-	-	-	-	3	-	-	-	-	-
Aggressive lobbying from motorists	-	-	4	-	-	-	-	-	-	-	3*	-	-
Increased work flexibility	-	-	-	-	-	-	-	5*	-	-	3*	-	-
Increased number of alternative fuel vehicles	-	-	-	-	-	-	-	-	-	-	-	2*	-
Desire for more aesthetic design	-	-	-	-	-	-	-	-	-	-	-	2*	-

*Indicates a tie

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3 Most Influential Societal Changes on Parking - Ranking

	AUSTRALIA	BRAZIL	BRITAIN	CANADA	EPA	FINLAND	GERMANY	IRELAND	JAPAN	NORWAY	SPAIN	SWEDEN	USA
Increased Traffic Congestion	1	2	2	1	1	4*	2	4	-	3*	3*	-	1
Increased Fuel Prices	2	-	3	3	3	-	3	2	In top 5	-	1*	-	2
Increased use of mass transit	3*	-	-	5	4*	4*	-	5*	In top 5	3*	3*	5*	-
Economic pressures	3*	4	1	-	2	-	-	1	In top 5	3*	1*	-	Not asked in USA survey
Focus on sustainability	5	5	-	2	4*	1*	-	-	-	1*	-	1	4*
Desire for walkable communities	-	-	-	4	-	1*	4*	5*	In top 5	1*	-	2*	3
Aging population	-	-	-	-	-	1*	1	-	In top 5	-	-	-	5
Increased migration to urban areas	-	3	-	-	-	4*	-	-	-	3*	-	5*	-
Concerns about safety	-	1	-	-	-	-	4*	-	-	-	-	-	-
Increased use of bicycles	-	-	5	-	-	-	-	3	-	-	-	-	-
Aggressive lobbying from motorists	-	-	4	-	-	-	-	-	-	-	3*	-	-
Increased work flexibility	-	-	-	-	-	-	-	5*	-	-	3*	-	-
Increased number of alternative fuel vehicles	-	-	-	-	-	-	-	-	-	-	-	2*	-
Desire for more aesthetic design	-	-	-	-	-	-	-	-	-	-	-	2*	-

*Indicates a tie

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3 Most Influential Societal Changes on Parking - Ranking

	AUSTRALIA	BRAZIL	BRITAIN	CANADA	EPA	FINLAND	GERMANY	IRELAND	JAPAN	NORWAY	SPAIN	SWEDEN	USA
Increased Traffic Congestion	1	2	2	1	1	4*	2	4	-	3*	3*	-	1
Increased Fuel Prices	2	-	3	3	3	-	3	2	In top 5	-	1*	-	2
Increased use of mass transit	3*	-	-	5	4*	4*	-	5*	In top 5	3*	3*	5*	-
Economic pressures	3*	4	1	-	2	-	-	1	In top 5	3*	1*	-	Not asked in USA survey
Focus on sustainability	5	5	-	2	4*	1*	-	-	-	1*	-	1	4*
Desire for walkable communities	-	-	-	4	-	1*	4*	5*	In top 5	1*	-	2*	3
Aging population	-	-	-	-	-	1*	1	-	In top 5	-	-	-	5
Increased migration to urban areas	-	3	-	-	-	4*	-	-	-	3*	-	5*	-
Concerns about safety	-	1	-	-	-	-	4*	-	-	-	-	-	-
Increased use of bicycles	-	-	5	-	-	-	-	3	-	-	-	-	-
Aggressive lobbying from motorists	-	-	4	-	-	-	-	-	-	-	3*	-	-
Increased work flexibility	-	-	-	-	-	-	-	5*	-	-	3*	-	-
Increased number of alternative fuel vehicles	-	-	-	-	-	-	-	-	-	-	-	2*	-
Desire for more aesthetic design	-	-	-	-	-	-	-	-	-	-	-	2*	-

*Indicates a tie

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3 Most Influential Societal Changes on Parking - Ranking

	AUSTRALIA	BRAZIL	BRITAIN	CANADA	EPA	FINLAND	GERMANY	IRELAND	JAPAN	NORWAY	SPAIN	SWEDEN	USA
Increased Traffic Congestion	1	2	2	1	1	4*	2	4	-	3*	3*	-	1
Increased Fuel Prices	2	-	3	3	3	-	3	2	In top 5	-	1*	-	2
Increased use of mass transit	3*	-	-	5	4*	4*	-	5*	In top 5	3*	3*	5*	-
Economic pressures	3*	4	1	-	2	-	-	1	In top 5	3*	1*	-	Not asked in USA survey
Focus on sustainability	5	5	-	2	4*	1*	-	-	-	1*	-	1	4*
Desire for walkable communities	-	-	-	4	-	1*	4*	5*	In top 5	1*	-	2*	3
Aging population	-	-	-	-	-	1*	1	-	In top 5	-	-	-	5
Increased migration to urban areas	-	3	-	-	-	4*	-	-	-	3*	-	5*	-
Concerns about safety	-	1	-	-	-	-	4*	-	-	-	-	-	-
Increased use of bicycles	-	-	5	-	-	-	-	3	-	-	-	-	-
Aggressive lobbying from motorists	-	-	4	-	-	-	-	-	-	-	3*	-	-
Increased work flexibility	-	-	-	-	-	-	-	5*	-	-	3*	-	-
Increased number of alternative fuel vehicles	-	-	-	-	-	-	-	-	-	-	-	2*	-
Desire for more aesthetic design	-	-	-	-	-	-	-	-	-	-	-	2*	-

*Indicates a tie

GLOBAL PARKING ASSOCIATION LEADERS SUMMIT 2013 DUBLIN

3 Most Influential Societal Changes on Parking - Ranking

	AUSTRALIA	BRAZIL	BRITAIN	CANADA	EPA	FINLAND	GERMANY	IRELAND	JAPAN	NORWAY	SPAIN	SWEDEN	USA
Increased Traffic Congestion	1	2	2	1	1	4*	2	4	-	3*	3*	-	1
Increased Fuel Prices	2	-	3	3	3	-	3	2	In top 5	-	1*	-	2
Increased use of mass transit	3*	-	-	5	4*	4*	-	5*	In top 5	3*	3*	5*	-
Economic pressures	3*	4	1	-	2	-	-	1	In top 5	3*	1*	-	Not asked in USA survey
Focus on sustainability	5	5	-	2	4*	1*	-	-	-	1*	-	1	4*
Desire for walkable communities	-	-	-	4	-	1*	4*	5*	In top 5	1*	-	2*	3
Aging population	-	-	-	-	-	1*	1	-	In top 5	-	-	-	5
Increased migration to urban areas	-	3	-	-	-	4*	-	-	-	3*	-	5*	-
Concerns about safety	-	1	-	-	-	-	4*	-	-	-	-	-	-
Increased use of bicycles	-	-	5	-	-	-	-	3	-	-	-	-	-
Aggressive lobbying from motorists	-	-	4	-	-	-	-	-	-	-	3*	-	-
Increased work flexibility	-	-	-	-	-	-	-	5*	-	-	3*	-	-
Increased number of alternative fuel vehicles	-	-	-	-	-	-	-	-	-	-	-	2*	-
Desire for more aesthetic design	-	-	-	-	-	-	-	-	-	-	-	2*	-

*Indicates a tie

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3 Most Influential Societal Changes on Parking - Ranking

	AUSTRALIA	BRAZIL	BRITAIN	CANADA	EPA	FINLAND	GERMANY	IRELAND	JAPAN	NORWAY	SPAIN	SWEDEN	USA
Increased Traffic Congestion	1	2	2	1	1	4*	2	4	-	3*	3*	-	1
Increased Fuel Prices	2	-	3	3	3	-	3	2	In top 5	-	1*	-	2
Increased use of mass transit	3*	-	-	5	4*	4*	-	5*	In top 5	3*	3*	5*	-
Economic pressures	3*	4	1	-	2	-	-	1	In top 5	3*	1*	-	Not asked in USA survey
Focus on sustainability	5	5	-	2	4*	1*	-	-	-	1*	-	1	4*
Desire for walkable communities	-	-	-	4	-	1*	4*	5*	In top 5	1*	-	2*	3
Aging population	-	-	-	-	-	1*	1	-	In top 5	-	-	-	5
Increased migration to urban areas	-	3	-	-	-	4*	-	-	-	3*	-	5*	-
Concerns about safety	-	1	-	-	-	-	4*	-	-	-	-	-	-
Increased use of bicycles	-	-	5	-	-	-	-	3	-	-	-	-	-
Aggressive lobbying from motorists	-	-	4	-	-	-	-	-	-	-	3*	-	-
Increased work flexibility	-	-	-	-	-	-	-	5*	-	-	3*	-	-
Increased number of alternative fuel vehicles	-	-	-	-	-	-	-	-	-	-	-	2*	-
Desire for more aesthetic design	-	-	-	-	-	-	-	-	-	-	-	2*	-

*Indicates a tie

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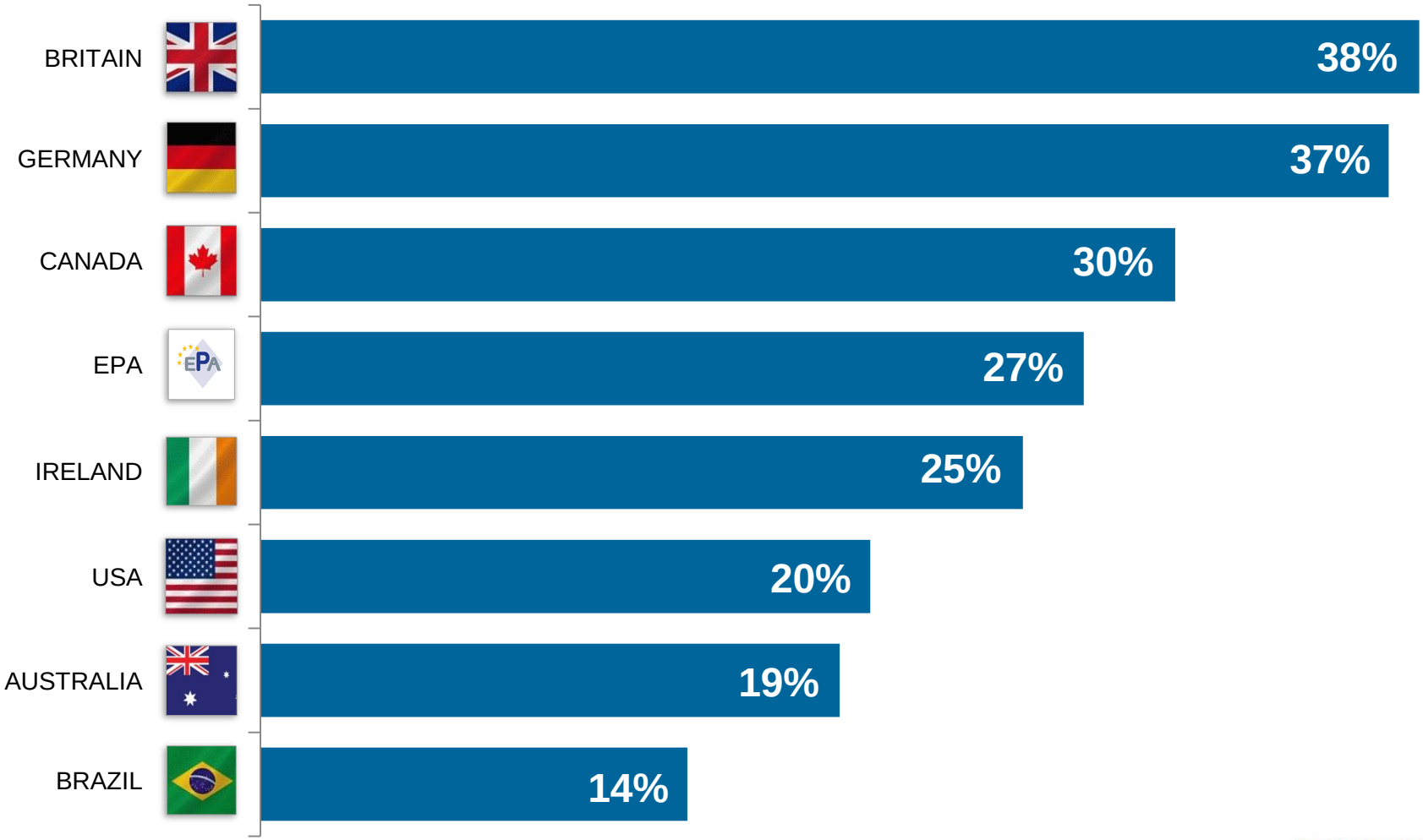
Question 4: “Which ONE of the following groups do you believe should be the highest priority to educate about the value of parking expertise early in the planning process of any project?”

4 Highest Priority Group to Educate About Parking

Urban Planners



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4 Highest Priority Groups to Educate About Parking

Size and order of groups denotes how respondents emphasized importance

Urban Planners

Local Government Officials

Facility Managers

Politicians

Property Owners & Developers

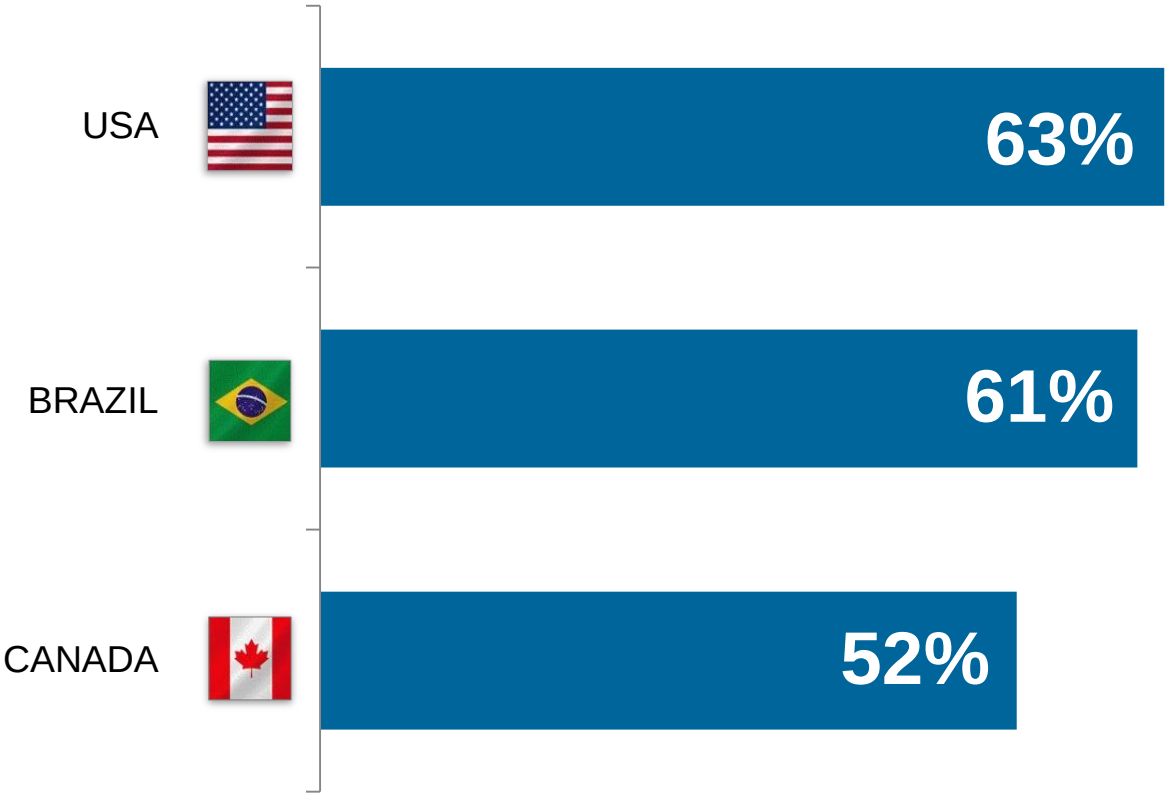
Architects

Transportation Officials

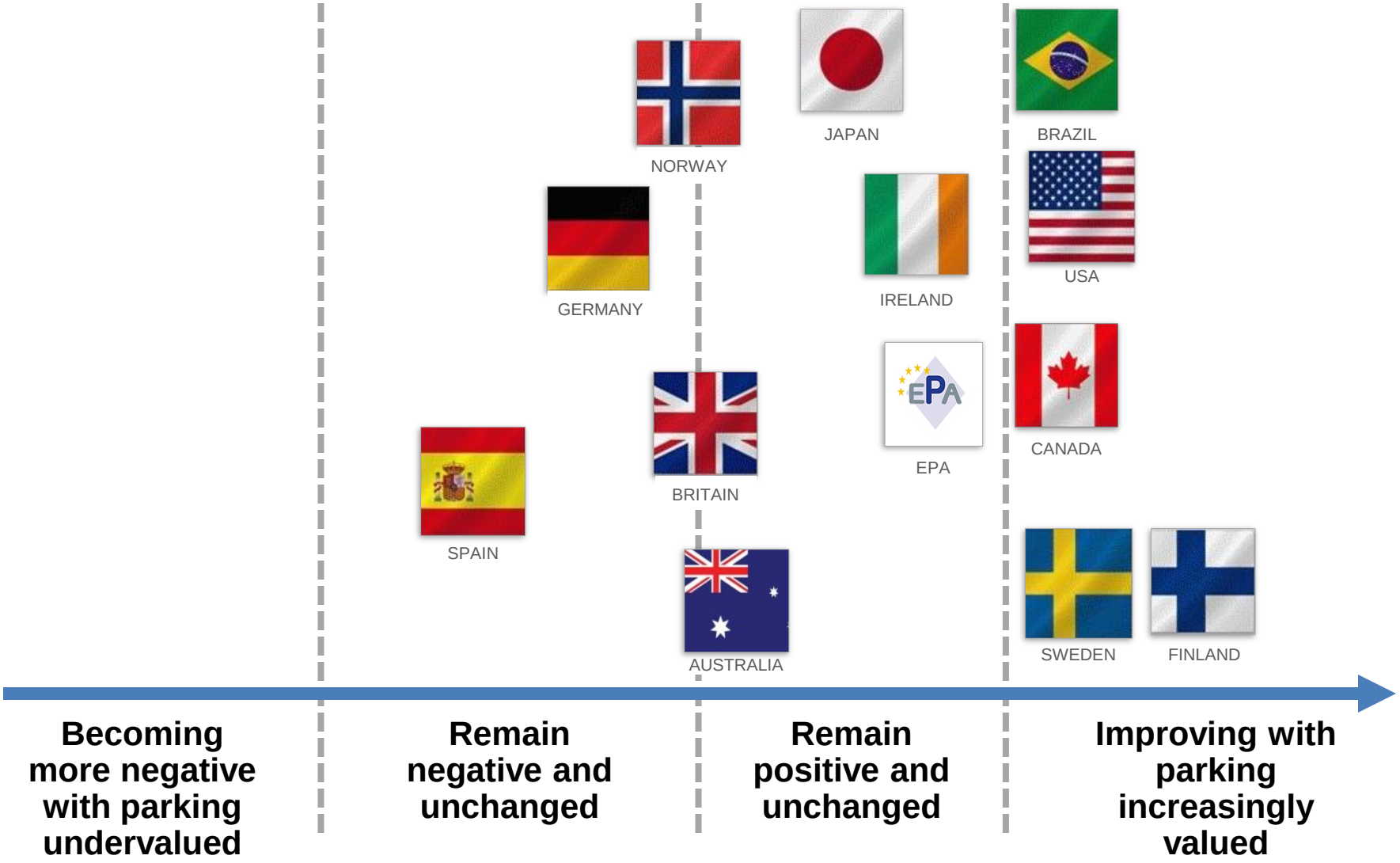
Question 5: "What statement best describes current attitudes among decision-makers such as city officials, planners, and developers about the role parking plays in contributing to transportation, urban mobility, and economic development solutions?"

5 Current Attitudes Among Decision Makers About Parking

Attitudes about parking are improving with parking considered increasingly important



5 Current Attitudes Among Decision-Makers About Parking



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GPALs Survey
Questions 6, 7 & 8

Open-ended Questions

Question 6: “Name up to THREE cities WITHIN or OUTSIDE your own country that you would consider trendsetting and/or progressive in terms of its approach to parking.”

6 Top Trendsetting Cities In Parking

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Question 7: "What research would be most valuable to conduct?"

7 Most Valuable Research to Conduct

- **The functioning of parking [parking economics and TDM]: 43%**
- **Impact of parking on urban mobility, sustainability and Quality of Life: 23%**
- **New technological issues: 11%**
- **Image/Perception of parking for other urban actors: 8%**
- **Focus on customers needs: 8%**
- **Relationship between parking and retail: 4%**
- **Impact of major societal changes [i.e. demographics,…] on parking: 3%**

✓**No major differences among countries**

✓**Retail issue more important in Europe (especially UK)**

7 Most Valuable Research to Conduct

The functioning of parking [parking economics and TDM]: 43%

Some examples:

- **Economics of parking and ROI to cities;**
- **Utilization on street and turnover of spaces;**
- **Why drivers pass by empty car parks and waste time circulating the High Street for a space?**
- **The effects private parking for employees have on the transportation system**

Question 8: “Looking beyond this year, what do you believe will have the greatest impact on the future of parking?”

8 Greatest Impact on the Future of Parking

Total sample:

- **Technology: 33%**
- **Dealing with scarcity of space and resources and rising mobility costs in urban areas: 33%**
- **Full integration of parking in sustainable urban mobility: 21%**
- **Major societal changes [i.e. demographics, culture,…]: 11%**
- **Need for good labour force: 2%**

✓ **No major differences among countries;**

✓ **European countries seem more interested in major societal changes**

The Big Picture

MOVING FORWARD…TOGETHER

- ✓ **Many common issues**
- ✓ **Technology is transforming parking**
- ✓ **Perceptions are improving**
- ✓ **Opportunities for collaboration**

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2014 DALLAS

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IPI Conference & Expo June 1-4, 2014 – GPALS June 1, 2014

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16th EPA Congress
DUBLIN 2013
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Contemporary Approaches to Parking Pricing:

A PRIMER

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1.0 Introduction

United States drivers were introduced to the concept of paid, on-street parking in 1935 when the first parking meter was installed in Oklahoma City. In the ensuing decades little was done to improve the basic tools or processes of parking pricing. Many cities arbitrarily set fixed parking rates that resulted in excess demand for a finite resource. The failure of cities to price parking based on demand has resulted in an underperforming parking system, the impacts of which include lost revenue, increased congestion, decreased access to businesses, environmental harm, and inconveniences to travelers.

Underpriced and free parking also distort travel decisions. Studies have found that free parking can increase the drive-alone rate for commute trips by as much as 50 percent (Hess, 2001; Willson and Shoup, 1990a; San Francisco County Transportation Authority, 1996) and work by Donald Shoup (2006) reported that approximately 30 percent of cars in congested downtown traffic may be looking for parking, adding unnecessary vehicle trips to already congested areas. Correctly pricing parking can help address these issues.

Today, technological advances offer the opportunity to effectively manage and price parking. Improvements in parking management infrastructure and tools combined with innovative thinking by politicians, transportation and parking professionals, and researchers are advancing the field of parking management. New technologies are making it possible to collect and analyze large amounts of data about parking utilization. That in turn allows cities to define clear policy goals and accurately adjust pricing to meet those goals. Better technology has also improved revenue management, provided users with more payment options, and improved enforcement while lowering associated costs.

Because of the opportunities brought about by these new technologies, cities across the United States are able to improve their parking pricing policies to address congestion, improve customer service, increase availability, and address safety concerns for non-motorized travelers. For example, San Francisco and Seattle have both established occupancy goals for on-street parking. San Francisco aims to achieve occupancy rates between 60 to 80 percent and Seattle has a goal of two open spaces per block. Each city now regularly adjusts meter rates to meet the identified goals. Chicago and San Francisco are exploring the use of parking pricing as an alternative to cordon charges. Boulder and Aspen, Colorado have residential parking permit programs that allow commuters to purchase parking passes on a space-available basis. New York City is testing peak-hour parking charges, and Washington, DC is using license plate reader technology to support and analyze its performance-pricing program. Recent experiences in these cities and others provide lessons and opportunities for practitioners interested in advancing parking pricing policies.

This primer discusses advances covering a broad array of parking pricing applications, available technology, preferred user accommodations, and strategies for gaining public acceptance for policy changes. The information provided is meant to increase awareness of innovative approaches, help communities design strategies that are applicable to their unique needs, and encourage new innovations in the field of parking pricing.

The programs and policies discussed here are likely just the beginning of what will be transformative changes to parking management across the United States. Parking professionals will find ways to use technology that have not yet been considered, parking managers will push for more advanced equipment, parking technology will become more affordable, and consensus builders will advance new policies. The Federal Highway Administration (FHWA) hopes that this primer helps to further discussion and innovation during this exciting period.

Pricing Overview 2.0

FHWA and local governments are looking at leveraging market forces by pricing transportation resources to reduce congestion. Pricing, if properly instituted, accomplishes three important objectives:

1) It can allocate scarce transportation resources in a way that mitigates congestion and ensures greater efficiency from the entire transportation system;

2) It reduces potentially market distorting subsidies that have induced excess auto travel; and

3) It creates a revenue stream that can be invested in access enhancements, which could in turn reduce parking (and driving) demand.

Pricing parking can be a powerful tool—especially when used in conjunction with other travel demand management strategies—to influence travelers' decisions about whether to drive alone, carpool, use transit, or use non-motorized travel modes. Reductions in drive-alone travel can subsequently reduce emissions and congestion and improve access and revenue generation.

This section of the primer discusses the two basic approaches to parking pricing: 1) free and fixed-rate pricing and 2) performance-based pricing. Within performance-based pricing there are two primary strategies: variable prices and escalating prices. These approaches can be used by cities to better manage parking supplies while simultaneously improving the travel experience of those who continue to choose driving. Depending on how parking revenues are invested, a parking strategy can more broadly improve access to an area where the desire to drive and park currently exceeds road capacity and/or parking supply.[1]

2.1 FREE AND FIXED RATE PARKING

Cities own a tremendous amount of real estate that comprises the public right-of-way (ROW). While the value of the ROW as an asset is implicit in permit fees for uses ranging from block parties and construction to non-automobile storage, peculiarly, most cities allow residents and visitors to store their automobiles rent free on much of the ROW. In some instances, typically in business districts, municipalities will charge nominal parking meter fees. Because cars are parked about 96 percent of the time and because estimates of the number of parking spaces per automobile range from three to five, the 194 million registered vehicles in the United States take up between 5,200 and 8,700 square miles of parking space. The land devoted to parking in the United States could fill an area between the size of Connecticut and New Jersey—a valuable asset that is underutilized.

As noted in the introduction, the first parking meters were installed in Oklahoma City in 1935. Studies pre-dating the installation of those meters showed that vehicles parked on commercial streets belonged, by and large, to local merchants and their employees. Customers, who had begun to own automobiles at increasing rates, were left to circle around hoping that a parking space would become available. These drivers contributed to the incipient but fast growing downtown congestion problems. Civic leaders recognized that by renting the curb, rather than giving it away, they could shift the dynamic. Meters were first installed on only one side of each street. In the morning, as workers and merchants arrived, the free spaces quickly filled. By 10:00 a.m., as shoppers came downtown, metered spaces made up the majority of available parking. As customers completed their business and departed, the metered spaces were used by later arriving customers, who also paid for use of the parking spaces. By one account, merchants

[1] In many instances of apparent parking under-supply it is infeasible and/or unsound to add parking capacity. This occurs where the street system is also congested and where adding parking would require reducing active uses of the land.

on the free side began to clamor for meters on their side as well (Popular Mechanics, 1935). The pricing strategy was very effective; instead of having all the spaces taken up by all-day parkers, ample turnover allowed many users to access the area. In short order, other cities adopted this approach to rationing the curb. All-day parkers resorted to finding spaces in slightly more remote areas, or left their vehicles at home, allowing the high-demand spaces to turn over repeatedly throughout the day. The outcome was good for business and good for street performance.

With inflation, however, the price of the meters effectively became lower and lower, and the rationing effect was eroded. Losing sight of the initial reason for meter installation, city leaders became dependent on parking revenues but lacked the political will to price the curb effectively to continue the initial success. Instead, downtown merchants, fearing competition from the burgeoning suburbs, fought for cheap or free parking.

Boston is an instructive case. In January 2011 Boston increased meter rates for the first time in 25 years, after "mulling it over for 10 years" (Andersen 2011). By the time of the rate increase, the pre-existing $1.00 an hour meter rate, set uniformly across the city, had lost value with inflation. The rate was effectively half what it had been when it was set in the mid-1980s. To restore the meter rate to what it had been the city would have had to double the rate to $2.00. Rather than use a performance-based pricing strategy, as explained below, the city simply increased the rate to $1.25 and justified the increase as a way to raise revenue for the city's general fund. Lacking a travel management rationale, the rate hike was seen by parkers as a tax on drivers.

On-street parking and most municipally or publicly owned off-street parking, particularly at transit stations, has traditionally been free or set at fixed prices that vary little by location or time of day. In those cases where prices had at some time been established according to supply and demand, the failure of pricing to keep pace with inflation (and demand) has left the municipalities and agencies in charge of parking pricing without a sound justification for taking action. As in the Boston example, fixed-price parking, across time and geography, without respect to demand or inflation, is not very different from free parking in terms of congestion mitigation and access. Fixed-price parking has a benefit over free parking in that it does signal a fee for use of the space rather than simply an entitlement to the ROW, but it falls far short of its potential as an effective demand management tool.

In the 1960s and 1970s, cities concerned about competition from suburban merchants focused on trying to offer free and abundant parking instead of focusing on parking access. Boulder, Colorado, however, was an exception. Boulder's city leaders and merchants believed the essential ingredient to success was available parking for those who drove to the main business district, but, at the same time, they saw the value of rationalizing access, realizing that in order to offer abundant free parking, as suburban developers did, they would have to redevelop in a suburban style. By allowing the large-scale development of parking facilities, the city would essentially erode land values and become "suburban" itself. Instead, the city established the first parking benefit district, charging for parking, coordinating on-street and off-street fees, and using the revenue to enhance other transportation modes.

Photo credit: iStockphoto

Rather than maintaining fixed pricing, increasingly cities are taking a holistic approach, as Boulder did. The current approach considers access broadly, taking into account all travel modes, and uses modern parking-management strategies to define and meet demand. These cities set parking rates to achieve specific occupancy goals or other objectives. Depending on the goals and local conditions, parking rates can vary by location, time of day, and presence of a special event. Policies and subsequent pricing are data-driven and designed to balance demand throughout neighborhoods and central business districts. Because they are data-driven, these policies allow city managers to adjust prices quickly based on economic and land-use changes.

2.2 PERFORMANCE-BASED PRICING

Fixed-rate pricing has been the standard parking-pricing option for cities since the parking meter was introduced. While it may not adequately price parking, it does have advantages. The pricing scheme can be implemented with mechanical meters, requires no additional special equipment, and does not require the collection of data regarding parking utilization and availability. Unfortunately, fixed-rate pricing fails to manage parking supply.

Pricing parking based on performance goals for the street or transportation system, often called performance-based pricing, allows cities to better manage the parking supply. Parking experts generally agree that 10 to 20 percent (one or two spaces) of on-street parking per block should be vacant most of the time as a way to reduce or eliminate cruising for parking (BPR, 1956; Levy, et al. 2012). Higher vacancy rates may be a sign that pricing is too high.

While a vacancy rate of 10 to 20 percent might be the most common performance goal used by cities, other goals can be considered as well. Pricing can be set to drive turnover, maximize value extraction, and transition travelers away from private automobiles to more sustainable travel modes. In any case, the performance standard is met through various pricing schemes, including rates that escalate the longer a person is parked, prices that vary by location, prices that vary by time of day, or a combination of these options.

Implementing a performance-based pricing program begins with understanding the local parking context and establishing a balance between parking supply, both on street and off, and demand. Accurate and up-to-date supply and demand data are helpful to determine appropriate parking rates, but the rates can be set empirically as well. San Francisco and Seattle are good examples of cities that are empirically setting rates to reduce cruising. San Francisco has taken a complex approach with the aid of "smart" meters that can accommodate multiple forms of payment, charge variable parking rates, and record data regarding usage and duration of use; parking sensors; and a very advanced data collection system, whereas Seattle is experimenting with a low-technology approach that focuses on manual measurements of on-street parking conditions. Both cities seek to set rates that assure an appropriate level of available space (see the Seattle case study in section 7 and the San Francisco callout at the end of this section).

Variable Rates

Parking rates should be allowed to vary across a variety of dimensions. One dimension should be geographical, as some areas of a city will have greater parking demand than others. Rates should also vary by time of day, which is already a common practice as meter rates are typically in effect only during daytime hours and overnight parking is free. A few cities, New York City and San Francisco being notable examples, have implemented differential parking rates that vary by time of day based on changes in parking demand. New York City implemented variable parking rates in two pilot neighborhoods. In one neighborhood the peak rate is charged between 12:00 p.m. and 7:00 p.m. and in the other neighborhood the peak rate is charged between 6:00 p.m. and 10:00 p.m. As in most meter applications, overnight parking is still free, leaving three distinct price regimes throughout the day. Rates should also vary across days of the week, as some areas will have higher demand on weekdays than weekends and vice versa. They should also vary across time more generally: as inflation erodes prices and as areas gain or decline in popularity, meter rates should fluctuate to reflect these realities.

A somewhat controversial approach is to vary prices in real-time, which the District of Columbia is proposing to pilot for some on-street commercial vehicle parking. This approach is analogous to a travel lane that is priced to ensure a particular travel time. As parking utilization on a given block increases, the price escalates from a base

price. The practice is more controversial with respect to parking as there is a value-driven belief among most city leaders that people should have a reasonable a priori expectation of prices. Also, it may be counterproductive to keep the price low for people who arrived during a period of high availability. That outcome would encourage people to arrive early and stay for longer periods.

Escalating Prices

Often used in off-street parking, escalating rates increase the longer a vehicle is parked at a location. The rate structure is designed to discourage long-term parking, thereby increasing parking turnover and availability. Differentiated rates are common practice at airports. Airport operators typically divide parking into short-term and long-term lots. The spaces nearest the terminal are well suited to people who are dropping off or picking up passengers and will only use the space for a short time. People who will be parking overnight or for multiple days are often accommodated farther away so the airport operator has adequate parking supply for those who need the more convenient spaces. The way that airports enforce the distinction is by setting different prices. Frequently they will set an escalating price in the short-term lot to discourage long stays. Atlanta's Hartsfield-Jackson airport charges short-term parkers $2.00 per hour for the first 2 hours and then $3.00 per hour for the next 4 hours. At Chicago's O'Hare Airport they charge $2.00 for the first hour, $3.00 for the second hour, nothing for the third hour, and then a steep rise to $5.00 for the fourth hour and $19.00 for the fifth hour. An escalation like this encourages people to park only for short periods to accomplish a task. In the case of an airport, the task is to pick up passengers.

Cities may also use this model where they wish to encourage additional parking turnover. For example, they may wish to use this approach in commercial areas that have many deliveries. If deliveries can be accomplished in 1 or 2 hours, having a third and fourth hour charge that is very high will discourage all-day parkers, allowing an adequate turnover rate so that deliveries can be accommodated. In New York City, certain spaces throughout the city are designated for commercial vehicles. The rate for these spaces is $4.00 for the first hour, $5.00 for the second hour, and $6.00 for the third hour.

2.3 PARKING TURNOVER VERSUS PARKING AVAILABILITY

Cities that have adopted explicit performance goals usually seek to achieve a certain level of parking turnover or a certain level of parking availability. At the heart of each goal is the objective that people wishing to park should be able to do so with minimum search costs. As a practical matter turnover may be hard to measure (especially if space sensors have not been deployed), which means it is difficult for a city to know if it has met a turnover-related performance standard; however, availability may be simpler to measure (e.g., by occasionally conducting manual counts and supplementing such counts with meter-payment data). Turnover is also harder to enforce. Many cities adopted time limits on metered spaces to meet their turnover goals. Anecdotally it is unclear that citizens understand that a time limited meter is to be vacated at the end of the time limit. Many people think they need only return to their

SF*park*

SF*park* is the nation's largest and most sophisticated performance-parking program to date. It includes 6,000 parking spaces in seven pilot districts and has received over $19 million in Federal funds to implement. SF*park*'s overarching goal is to price city-owned on-street and off-street parking facilities at rates that help redistribute demand and ensure that one parking space is usually available per block and that at least some parking will be available in garages. Additionally, SF*park* is intended to change public attitudes towards metered, on-street parking by providing better parking information and customer service.

The heart of the program is its technological innovation and data collection: sensors at each of the 6,000 parking spaces collect real-time occupancy information that is used to make future pricing decisions that are data-driven and easily understood by the traveling public. Smart-meters play a crucial role in the program by allowing SF*park* to charge different rates at different times and to adjust pricing remotely. The city uses an in-house database tool to link data from its various parking assets and make rate adjustments. Parking rates are set to achieve occupancy goals of 60 to 80 percent and can range between $0.25 and $6.00 per hour. Rates vary both geographically and by time of day.

SF*park* has developed a book detailing the innovative program's implementation and lessons learned. The book, "SF*park*: Putting Theory Into Practice," is available from the SF*park* Web site at *SFpark.org*.

car and "feed the meter" in order to be in compliance with the regulation. The evidence shows that meter time limits are frequently violated (Weinberger et al., 2010). Time limit enforcement used to rely on agents placing chalk marks on the tires of parked cars. Newer approaches use license plate recognition technologies but still require an enforcement agent to make frequent passes along the streets.

Technological advances have made obtaining data, setting prices, and adjusting prices much easier. New smart meter systems can accommodate multiple forms of payment, charge variable parking rates, and record data regarding usage and duration of use. These meters can be supplemented with parking sensors and license plate reader technology, both of which have been used by cities to determine occupancy with varying degrees of success.

Instituting different pricing strategies does not require advanced technology but it is made much easier and defensible with emerging meter and data collection technology. These technological advances are the subject of the next section.

3.0 Technology and Pricing

The tools to manage parking inventory and facilities are advancing rapidly, helping to support and make possible some of the parking pricing programs and policies discussed in the previous section of this primer. New technologies allow parking managers to collect large quantities of data at relatively low costs, which results in more transparent decisionmaking, particularly when setting parking rates. Technology advances also allow parking managers to implement dynamic pricing, increase revenue generation, offer real-time reporting, and allow for more efficient parking enforcement. At the same time that parking technology is improving the decisionmaking and management process, it is also improving the customer service experience. This combination of improvements can decrease the potential for negative reactions to new parking policies and prices.

Electronic parking meters have essentially replaced mechanical meters, offering improved security and a simplified process for changing parking rates. Today, intelligent single-space parking meters, multi-space meters, pay-by-phone technologies, and automated off-street facilities offer even more convenience and flexibility. These technologies increase the number of payment options available to users, provide more information regarding revenue and utilization, and allow for real-time updates to pricing. Advances in license-plate-recognition (LPR) technologies and space sensors further improve enforcement and data collection.

The customer benefits associated with new technologies are significant. Users can receive real-time information regarding available parking spaces and pricing, have multiple payment options, remotely extend their parking time using a phone or computer, and even be told where they parked if they have forgotten.

This section of the primer discusses available parking technologies, items to consider when selecting a technology, and options for implementing advanced parking policies with older parking assets.

3.1 AVAILABLE TECHNOLOGY

What follows is a list of currently available technology to accept parking payments, monitor use, and conduct enforcement. The list represents both older and newer technologies and includes assets applicable to on-street and off-street parking spaces.

Single-space Meters

Single-space meters are the oldest type of parking asset and have traditionally been very limited in their ability to accept multiple payment options, adjust prices, report revenue collected, and monitor utilization; however, intelligent single-space meters have been developed that can be retrofitted into existing meter housings and accept both coin and credit card payments. These meters are solar powered, wirelessly networked to allow real-time reporting, automatically report system failures, and support dynamic pricing. Responding to other technology innovations, discussed later, they can also integrate with pay-by-phone systems and vehicle-detection sensors.

The benefits of single-space meters include the ability to pay at the space rather than at a central payment location; the presence of a visual reminder to users (i.e., the meter itself) that they must pay to park; the failure of a meter affects only one parking space rather than an entire block face or parking lot; meter mechanisms can be removed for repair at a maintenance facility; and enforcement personnel can visually determine if a vehicle is in violation. Upgrading to the intelligent single-space meters also allows existing meter housings to be reused, reducing system retrofit costs and allowing for faster installation.

Multi-space Meters

The multi-space meter classification represents a broad assortment of payment and technology options. Multi-space meters are common with both on-street and off-street facilities and can support pay and display, pay by space, and pay by license plate. While each of these has unique benefits and applications, all are capable of accepting coin and credit card payments, real-time reporting, and dynamic pricing while reducing the clutter associated with single-space meters. Specific options associated with multi-space meters are summarized below:

- Pay and display requires users to walk to a central pay station, make their payment, and place a receipt on their vehicle's dashboard. This option allows enforcement personnel to determine quickly if a vehicle is in violation of time limits and, as long as time remains on users' receipts, they can move within a parking district without making additional payments. A disadvantage is that users may find it inconvenient to return to their vehicles after paying. Also, if a pay-and-display station is out of service, multiple parking spaces are affected, resulting in lost revenue.
- Pay by space functions similarly to pay and display, but rather than placing a receipt on their dashboard, users enter a space number associated with their parking space. Complaints are reduced because users do not need to return to their vehicle, but enforcement personnel must pull reports to determine which occupied spaces may be in violation of time limits, which can slow enforcement processes. It is possible to integrate this payment system with space sensors, discussed below, to simplify the enforcement process. Pay by space removes the option that allows users who still have parking time remaining to move to another space within a parking district without paying again. As with pay and display, an out-of-service station will affect numerous parking spaces.
- Pay by license plate is very similar to pay by space; however, rather than entering a space number, users enter their license plate number. The primary drawback is that some users do not know their license plate number or might key it in wrong. As with pay and display, this option allows users with parking time remaining to travel within a parking district without paying additional fees.

In-car Meters

In-car meters are small, programmable devices that hang from rearview mirrors and driver's side grab bars (handles located above the driver's side window) or are placed on dashboards. The meters are pre-loaded with funds that are deducted based on the location of a vehicle and duration that it is parked. When users arrive at a parking space they select the appropriate parking zone, which tells the meter what parking rate to charge, and activate a timer that deducts funds from the user's account based on the time the vehicle is parked.

Reusable and disposable versions of in-car meters are available, and funds can be added over the phone, on the Internet, or using smart cards that are inserted into the devices. Some in-car meters contain Global Positioning System (GPS) cards that allow the meters to determine their location and automatically charge the appropriate rate. Efforts are currently underway to integrate in-car meters into vehicle navigation systems, such as OnStar. In-car meters offer an alternative to single-space and multi-space meters but do not typically replace those meters.

In-car meters allow users to pay only for the time they use, reduce the threat of vandalism, and yield higher levels of compliance. Because money is loaded onto the meters before use, parking departments have the dual benefits of receiving revenue up front while reducing collection costs. The ability to pay in the vehicle allows users to avoid standing outside to pay at single-space meters or walking to multi-space meters. Unlike multi-space and smart meters, however, in-car meters do not provide real-time information to parking managers. Some parking agencies have also expressed the concern that visibly placed in-car meters are subject to theft.

Photo credit: SF*park*

Pay-by-Phone

Pay-by-phone technology allows users to pay for parking by phone, text message, or with a smart phone application. Users are typically required to preregister and provide a credit card number. There are two ways in which this system charges for parking. The first option, typically referred to as "start duration," allows the user to arrive at a parking location, enter a code associated with the location, and select the amount of time they would like to park. Some systems will send text messages or other notifications to users before their time expires and allow them to add time with their phone, so long as doing so will not cause them to be parked beyond any existing time limits. The second option, called "start stop," requires parkers to contact the system when they first park and again when they are ready to leave.

Pay-by-phone systems are typically privately operated and are capable of integrating with intelligent single-space and multi-space meters and LPR technology. The integration with LPR means enforcement officers using that technology can be automatically notified of time violations. If not integrated with meters or LPR, pay-by-phone systems require enforcement officers to check an additional database before issuing a parking violation. Any cities using pay by phone must share data regarding street sweeping, time limits, and other restrictions with the vendor to assure that the data remain up to date. Creating a process and system through which this information can be shared is a significant and potentially costly undertaking that may require changes to business processes and organizational culture; however, the end result is a system through which data can be easily shared across many departments and with the public.

Benefits include an additional, convenient payment option for users, the ability to add additional parking time remotely, and the capability to warn users if they attempt to park during a period in which restrictions are in place. The technology also reduces costs associated with cash collection and prevents users from exceeding posted parking time limits. Rates can be easily adjusted and the systems can provide utilization data.

Automated Technologies for Off-street Facilities

Some parking payment technology is specific to off-street parking facilities. This technology allows staffing at facilities to be reduced and can support real-time reporting. The two primary technologies are pay on foot and pay in lane, both of which are discussed below.

- Pay on foot allows users to obtain a parking ticket upon entering a facility and make their payment at a pay station before returning to their vehicle and exiting. At exit, an exit verifier accepts the customer's parking ticket, confirms that the parking fee has been paid, and allows the customer to exit. This system speeds up the exit process and reduces staff costs; however, users may forget to take their parking ticket with them or may not realize that they must pay before exiting. Installing exit lane verifiers that can accept credit cards for payment or providing vehicle escape lanes so customers can park again and visit a pay station can mitigate this issue. Additional drawbacks associated with pay on foot are the cost of the system and the loss of attendants. (Some communities place a high priority on the assistance that attendants are able to provide to visitors in terms of way finding, payment processing, and other general help.)

- Pay in lane requires users to pay for parking in the exit lane of a parking facility using an automated kiosk. This system can be less confusing than pay on foot because it allows users to leave their parking ticket in their vehicle and does not require users to make a payment prior to returning to their vehicle. Staffing costs are reduced, but no one

will be available to offer assistance to parkers. Pay-in-lane systems cost less than pay on foot because they do not require both pay stations and exit verifiers. Exit flow can be significantly reduced with pay in lane compared to pay on foot. Pay in lane can provide a way to reduce staffing needs during less busy times when parking demand, and therefore exiting traffic flow, is low (e.g., during evening hours or on weekends).

License Plate Recognition Technology

LPR technology uses cameras and optical character recognition to read license plates. The systems can be hand-held or vehicle-mounted and work in daylight and low-light conditions. Once read, the license plate is referenced against a database containing violation, payment, and other pertinent information.

LPR also serves as an enforcement and data collection mechanism. It is able to determine if a vehicle has remained in a parking space or district beyond allowed time limits or lacks a necessary parking permit. The technology can also be integrated with payment systems for off-street parking facilities. Entrance and exit barriers will automatically open for registered vehicles. If appropriate, users' accounts can be charged for the amount of time spent in the facility. LPR is also able to monitor vehicle occupancy and duration in both on-street and off-street facilities.

The systems help prevent fraud by replacing printed permits, can significantly decrease staffing requirements for enforcement personnel, can identify stolen or wanted vehicles, and can simplify duration counts. LPR technology is not perfect, however. Systems may have trouble reading some States' license plates, worn out license plates generally cannot be read, the readers are not effective if license plates are covered with debris such as dirt or snow, errors occur if enforcement personnel with vehicle-mounted systems drive too fast, and community members may raise privacy concerns.

Parking Space Sensors

Parking space sensors typically use ultrasonic, magnetometer, or digital-camera technology to determine if a space is occupied. The sensors can be placed in pavement, affixed to single-space parking meters, or hung from ceilings in parking garages. Space sensors are used for enforcement, data collection, and informing users of the location of available spaces. Data can also be used to determine occupancy rates.

Photo credit: SF*park*

Data from space sensors can be posted on Web sites, accessed through smart phones, or provided on message signs so that drivers know where to find open parking spaces. In off-street facilities the increased reliability associated with sensor data (versus magnetic loops) allows occupancy to be increased from an industry standard of 85 percent to 90 to 92 percent. Newer digital-camera parking sensors are able to determine vehicle type, color, and license plate number. If people cannot find their car they can enter basic details about their vehicle and the system will tell them where their vehicle is parked.

There are some drawbacks to these systems. The current cost of space sensors keeps them beyond the financial reach of most cities and parking facility operators. In-pavement sensors can allow water to flow behind them, negatively impacting the life of paving materials. Some sensors must also be flush mounted for snow removal and require battery replacement approximately every 5 years. Privacy concerns may also be raised with the use of camera sensors that record license plate information.

Databases

No company currently manufactures all types of parking technology. This means that cities wishing to use multiple types of technology, including LPR, smart meters, parking sensors, and pay by phone, will need to develop database tools to integrate data from the various systems. This is a process that can quickly become complex. *SFpark* and Seattle both had database tools developed to collect, store, and analyze data from parking assets. Personnel from SF*park* recommend that cities outsource development to assure they have sufficient staffing and skill levels. They also recommend that those staffs that will implement the tool be involved from the beginning, that one vendor not be allowed to control the process, and that cities understand that development will take longer than expected. Cities should also consider developing application programming interfaces that allow parking data to be shared with developers, who can then create applications for the public.

3.2 SELECTING A TECHNOLOGY

When selecting a technology, items to consider include reliability, purchase costs, installation costs, maintenance costs, staffing requirements, and revenue potential. Parking providers must determine whether the new technology needs to be integrated with existing infrastructure or if an entirely new system in needed. The data collection and analysis process will help narrow the technology options. As with other elements of parking management, selection of a final technology should be a community effort that involves affected stakeholders.

Once a technology has been selected, the parking provider needs to create a specifications package, which is generally released to vendors as part of a request for proposals (RFP) process. While RFPs need to be very clear to avoid any issues and potential challenges from bidders, many parking operators may be tempted to provide very detailed specifications that cover minutiae such as the location and color of buttons. Specify what an asset needs to do and what a report needs to contain, but maintain flexibility by avoiding unnecessary specifics.

3.3 DOING MORE WITH LESS

Some agencies may not have the money to purchase advanced meters, space sensors, and database solutions. Fortunately, innovative programs can be implemented with basic technology. A look at Seattle, the subject of a case study provided in section 7 of this primer, proves the point. Occupancy and duration information are the two primary data points driving price and time-limit decisions at the more innovative parking agencies. While it is much easier and quicker to collect this information with space sensors and to adjust prices with advanced meters, less technical options also exist.

In smaller downtowns it is possible to conduct license plate occupancy and duration counts that cover all or most of the inventory manually. These counts can be conducted with assistance from part-time employees or interns. Ideally, counts should be updated at least once a year or after changing prices or time limits. In larger communities it may not be possible to analyze all parking facilities on a regular basis. In this situation conducting counts in sample areas that are representative of the larger community can reduce costs. LPR technology can significantly decrease the staff time required to conduct occupancy and duration counts.

If a community has advanced meters but lacks space sensors, meter payment data can be used to roughly estimate parking occupancy and duration. SF*park* and other agencies are developing processes for doing this in an accurate manner. Meter data can be supplemented by manual counts.

Adjusting prices on an annual basis, rather than quarterly or monthly, will further reduce the staff time needed to implement a performance-based parking policy.

3.4 GOING FORWARD

In the future, technology will become more affordable, integrate better, and offer more opportunities for sharing data. Cities and municipalities are likely to use overlapping technologies such as parking meters, pay by phone, and LPR technology, which will likely result in increased demand for improved data integration. In turn, this should make it easier for cities to integrate parking payment and enforcement systems.

Improvements in LPR technology should make the collection and tracking of occupancy and duration data easier as well, and the way in which parking data are shared is also likely to change. Online and mobile tools that allow parkers to check on the availability and cost of parking are just beginning to appear, and their presence in the marketplace is likely to increase significantly in the future. The integration of radio-frequency identification chips that allow cell phones to communicate with nearby electronics will likely give parkers one more way to pay. The potential to integrate mobile devices into the payment, data tracking, and parking space locator functions should offer significant opportunities to innovative manufacturers and communities.

Mechanical parking meters ruled the world of parking for decades, negating the need for parking managers to monitor new technologies and manufacturers. Today a parking agency must carefully examine its technology options and attempt to see far enough into the future that its asset purchases do not become quickly outdated.

Technology	Accepts Cash (coins or bills)	Accepts Credit Cards	Requires User to Return to Vehicle	Time Can Be Added Remotely	Outage Affects Multiple Spaces	Provides Real-time Reporting	Transferable within a Parking Zone	Off-street Only	Potential Challenges	Cities Using the Technology
Single-space Meters										
Electronic	Yes	No	No	No	No	No	No	No	Difficult to change pricing, limited revenue reporting, on-street "clutter"	New York, NY; Boston, MA; Phoenix, AZ
Intelligent	Yes	Yes	No	Yes	No	Yes	No	No	Cost and on-street "clutter"	Denver, CO; Atlanta, GA; Seattle, WA; Los Angeles, CA
Multi-space Meters										
Pay and Display	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Users must walk back to car to place ticket on dashboard	New York, NY; Miami, FL; Long Beach, CA; Portland, OR; Washington, DC
Pay by Space	Yes	Yes	No	Yes	Yes	Yes	No	No	Users must remember their space number	Las Vegas, NV; Minneapolis, MN; Portland, ME; Atlanta, GA
Pay by License Plate	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Users must know their license plate number	Regional Transportation District, CO; Calgary, Canada
Automated Technologies for Off-street Facilities										
Pay on Foot	Yes	Yes	No	n/a	Yes	Yes	n/a	Yes	Can be confusing to users, no parking attendants to provide assistance	Milwaukee, WI; Cincinnati, OH; Seattle, WA; Bozeman, MT
Pay in Lane	Yes	Yes	No	n/a	Yes	Yes	n/a	Yes	Exit flow can be reduced, no parking attendants to provide assistance	Wilmington, NC; Lansing, MI
Other Options										
In-car Meters	No	Yes	No	n/a	No	No	Yes	No	No real-time reporting, subject to theft	Aspen, CO; Miami Beach, FL; New York, NY
Pay by Phone	No	Yes	No	Yes	Yes	Yes	Yes	No	Cities must create a process and system for sharing parking information across multiple departments	Washington, DC; Aspen, CO; Fort Lauderdale, FL, San Francisco, CA

Employer and Developer Focused Parking Pricing Strategies 4.0

Previous sections of this primer discussed pricing policies and tools that can be used to manage city-owned parking spaces and facilities. In most communities city-owned or controlled parking represents only a small proportion of the total parking available, and privately owned parking is often made available at no cost to drivers. Shoup estimates that 95 percent of commuters receive free parking at work (1997), and this free parking is not limited to suburban and rural locations; over 50 percent of automobile commuters in the central business districts of cities like Los Angeles, New York, and London receive free parking paid for by their employer (Wilson and Shoup 1990b, Schaller Consulting 2007, Department of Transport 1992).

While cities cannot directly control whether an employee receives free parking, a number of strategies exist to encourage employers and developers to charge for parking or, minimally, make employees more aware of the true cost of parking. Applying a cost to parking can reduce the number of people who drive alone, maximize the utilization of transportation facilities, and encourage more efficient land use.

Cities have the opportunity to influence three primary areas of commuter parking. First, cities can work with employers and developers on employee trip reduction programs that include parking pricing strategies. These can be voluntary or mandatory, depending on the severity of the problem. The transportation demand management field has found that parking cash out and transportation allowances can be used to raise commuter awareness of parking costs and encourage employees to walk, bike, carpool, or take transit to work. Parking cash out provides a payment that can be used to purchase transit fares or kept as cash to employees who elect to give up their employer-owned parking space. Transportation allowances are stipends provided directly to employees who can then choose to purchase parking, buy transit passes, carpool, or pocket the money for another use. There are many supporting strategies in the transportation demand management field that are not discussed in this primer, but can also influence an employee's commute behavior.

Cities have a second opportunity to influence commuter parking through zoning and development regulations. Cities are able to encourage developers to charge for parking separately from office space, a strategy often referred to as "unbundling" that allows employers to see financial benefits when they stop paying for employee parking. Unbundling in residential developments can also influence commute behavior and vehicle ownership levels. In addition, zoning codes can be written to encourage the allocation of parking for car-share vehicles,[2] free or discounted parking rates for carpools and vanpools, and the establishment of secure bicycle parking.

Cities can also design and charge parking taxes to encourage employers and developers to charge for parking, discourage the construction of excessive quantities of parking, and encourage more efficient land use. These strategies are detailed further below.

[2] Car sharing is a business model wherein users sign up for a membership and are able to rent cars by the hour. It is particularly suited for urban areas where car ownership is less desirable due to the prevalence of public transportation. This demand management mechanism is discussed in greater detail in section 5.

4.1 PARKING CASH OUT AND TRANSPORTATION ALLOWANCES

Parking cash out and transportation allowances are similar economic incentive tools. Parking cash out is effective when employers provide free parking to employees, often in employer owned or leased lots. Employees who choose to give up their parking space are offered a payment that can be used to purchase transit fares or kept as cash. Employees typically participate in cash out on a monthly basis, but daily cash out programs do exist. With daily cash out employees receive a set amount of money for each day that they choose to not drive to work. Parking cash out is a better strategy than direct parking charges at employment sites where a move to paid parking is likely to cause significant employee morale issues or where management, for whatever reason, is unwilling to ask employees to pay for parking.

Transportation allowances are provided directly to employees, who can then choose to purchase parking, buy transit passes, carpool, or keep the money. Transportation allowances are best used when employers do not own or lease parking spaces and failure to cover employees' parking costs may put the company at a real or perceived hiring disadvantage. In both cases, payments are tax exempt up to Federal limits when spent on parking, transit, vanpooling, or bicycle commuting.

Parking cash out and transportation allowances are successful because they apply a value to a commodity that is often perceived as free and allow employees to make travel decisions that maximize their individual welfare. The programs are palatable because employees are not asked to bear the actual cost of parking if they do choose to park. Employers can implement these policies on their own to help them compete for the best workers, or cities or states can mandate or incentivize their implementation to encourage reductions in driving.

Both cash out and transportation allowances have shown significant benefits in terms of reducing employee vehicle trips and parking demand. Shoup evaluated eight employer cash-out programs in California and found that, on average, the programs reduced drive-alone trips from 76 percent to 63 percent of total commute trips, increased carpooling from 14 percent to 23 percent, increased transit trips from 6 percent to 9 percent, and increased walking from 2 percent to 3 percent (1997). De Borger and Wuyts created a model using Belgian data to evaluate the effectiveness and costs of parking cash out. Their model results showed that parking cash out reduced car commuting by approximately 8.5 percent and increased transit use by 17 percent (2009). Within the model, congestion was also significantly reduced, with average speeds rising to almost 50 km/hour from 40 to 43 km/hour. Actual benefits will vary by geography. Shoup notes that trip reductions will depend "on the market price of parking at the worksite" (1995, 15).

Even if users are paying for their own parking in the form of a fixed-cost monthly parking pass, such a product can be redesigned to reward regular parkers with reduced costs or rebates for days they do not park. Such a redesign might be instituted by the parking operator or an employer offering a parking subsidy, but in either case it may be considered "daily parking cash out" if a financial incentive is provided for each day that parking is foregone. Alternatives to monthly parking passes were tested in Minneapolis, Minnesota, in 2010 and 2011. This research targeted purchasers of monthly parking passes and examined the effects of various alternative incentives. These incentives were either bundled with the parking pass or offered in the form of a restructured parking pass enabling both onsite parking and a choice of financially-attractive alternatives. Programs tested included:

- Buying Flexibility, where a heavily discounted monthly transit pass (i.e., $20 instead of $130) was made available for purchase in combination with the parking pass (despite very heavy marketing, only 14 people purchased this, and while results clearly seem to indicate reduced parking and more transit use, the sample size was too small to find statistical significance);

- Disincentive Removal, where a monthly transit pass was provided for free to purchasers of monthly parking passes;
- Marginal Rebate, where a monthly transit pass was provided free to purchasers of monthly parking passes, and those taking transit instead of parking any day of the month received a $2 rebate, which is reflective of the marginal parking cost of $7 per day and the marginal transit cost of $5 per day; and
- PayGo Flex-Pass, which is the same as Disincentive Removal, except that a rebate of $7 would be provided on days where neither parking nor transit was used (with the total monthly rebate capped at half the cost of the monthly parking pass).

The most flexible and successful of the incentive programs studied, PayGo Flex-Pass, led to a decline in driving days from 78.5 percent to 56.5 percent, a large reduction (Lari, et al., 2011).

Travel allowances have also proved successful at changing travel behavior. Los Angeles County replaced free parking for its employees with a travel allowance and saw solo driving decrease from 53 to 47 percent of commute trips. CH2M Hill in Bellevue, Washington, replaced free parking with a travel allowance and saw solo driving decrease from 89 to 64 percent of commute trips (USDOT, 1994).

As with any changes made to parking, cash-out programs and travel allowances can present challenges, but they may be overcome with careful implementation. The programs are also likely to increase costs slightly for employers; if employees do not use their payments for tax-deductible transportation expenses, employers must pay employment taxes on the amounts. Employers will also incur administrative costs. All these costs could, however, be offset by small reductions in travel allowances or parking subsidies (i.e., charging employees who decline a cash-out offer a small fee for parking).

The United States Government has developed a number of documents to assist governments and employers that are interested in implementing cash-out programs. The FHWA's Non-toll Pricing: A Primer (2009) provides an overview of parking cash out. The Federal Transit Administration's (FTA's) TDM Status Report: Parking Cash Out (1994) provides travel reduction benefit estimates and implementation steps for government agencies wishing to implement parking cash out. The EPA's Parking Cash Out: Implementing Commuter Benefits as One of the Nation's Best Workplaces for Commuters (2005) is a how-to guide for employers wishing to implement a parking cash-out program. The EPA's report also includes information on employer benefits and tax considerations. Less information has been published regarding travel allowances; however, the two strategies do not differ significantly in terms of implementation or cost.

Photo credit: FHWA

4.2 UNBUNDLED PARKING

The cost of parking for residential units and commercial space is often included or "bundled" in lease or purchase costs. This means that parking costs are "sunk" and cannot be avoided regardless of actual need. This serves as a disincentive to companies to offer cash out, as any reduction in parking space utilization will not be accompanied by an equivalent reduction in parking costs. It also encourages car ownership because residential renters or lessees will see no financial gain from reducing their off-street parking needs. "Unbundling" the cost of parking from commercial and residential leases and purchases addresses these issues by allowing buyers and lessees to purchase or lease only as much parking as they need.

The unbundling of parking at commercial locations has no direct effect on travel behavior if employers pay for their employees' parking. However, unbundling creates a financial incentive for employers to implement strategies that decrease the number of employees who drive to work. Unbundling also places a clear price on parking that employers may choose to pass on to employees.

In the residential setting, unbundling of parking can directly impact travel behavior. An analysis of the impacts of off-street parking on car ownership and vehicle miles of travel in New York City "strongly suggests that the provision of residential off-street parking effects commuting behavior" (Weinberger, et al., 2009, 24). Thus, decreasing the amount of off-street parking, which unbundling encourages, is likely to result in decreased vehicle trips among commuters.

An interesting study on managing residential parking in San Francisco with car sharing and unbundling examined the effects of two residential parking requirements there: that residential projects of 50 units or more offer one or two car-sharing spaces, and that off-street parking at residential projects of ten units or more be leased or sold separately from the property. The study found these policies to result in a significantly lower rate of household vehicle ownership and a higher rate of car-sharing membership. The most significant finding of the study was that the combination of unbundling parking with on-site car sharing vehicle access corresponded to an average vehicle ownership rate of 0.76 per household—which was a statistically significant reduction from the statistically indistinguishable rates of 1.03, 1.09, and 1.13 vehicles per household—where buildings had neither car sharing nor unbundling, car sharing only, and unbundling only. Clearly, then, there is a market in San Francisco, and likely elsewhere, for housing with unbundled parking and car sharing where residents respond with reduced vehicle ownership, and presumably take some of their savings and spend it for better housing and to occasionally use car sharing (ter Schure, et al., 2011).

Some developers have expressed concern that unbundled parking requirements may affect their ability to obtain loans. If parking utilization rates are lower than anticipated, the developer may not realize as much revenue as expected, which could affect loan repayment. It is therefore important that cities not require parking minimums when asking or requiring developers to offer unbundled parking.

Ideally unbundled parking will allow residents and employees to purchase parking on a monthly or even daily basis. In the case of commercial parking the spaces can be rented through the property management association or a third-party parking manager. In the case of residential parking, spaces can be leased through the homeowners' or umbrella owners' association. Each option allows businesses and residents to purchase only as much parking as they need.

4.3 PARKING TAXES AND FEES

Parking taxes and fees can affect travel behavior by decreasing the amount of available parking, increasing the cost of parking, or encouraging employers and developers to pass the cost of parking onto drivers. Fees and taxes do this by increasing the construction or maintenance cost of parking or by directly increasing parking rates. Drivers are able to respond to higher parking rates or lower availability by parking in another location, changing their travel mode, or changing the timing of their activities (Feitelson and Rotem, 2004). Taxes and fees are most appropriate when applied to parking that is not mandated or required by land use regulations.

The effect of parking taxes and fees is dependent on the type of tax used and the manner in which it is charged. Taxes can be placed into two primary categories: (1) taxes and fees charged to users and (2) taxes and fees charged to parking facility owners. User taxes and fees are typically charged on a per-transaction basis. They may be a percentage of the cost to park or a flat amount and typically only affect facilities where users are charged to park; although, such a limitation is not necessary. Taxes and fees charged to facility owners can be based on land value, surface area, or number of available parking spaces. These taxes and fees are extremely flexible: lots that charge parking fees can be excluded, credits can be issued when preferred spaces are offered to carpoolers or car-share vehicles, and garages and subterranean lots can be excluded or charged based on land area rather than facility square footage. Owner fees and taxes can exclude facilities that are charging market rates, which allows facilities that are already engaged in efficient parking management to avoid the fees and taxes. Funds from parking taxes and fees can be invested in transit and other transportation improvements that increase the number of travel options available.

User fees and taxes increase the cost of parking and encourage the use of non-auto travel modes and/or the shifting of travel times. Chicago currently charges a $3.00 per day tax for all vehicles that park in the central business district. San Francisco has a fee structure that provides a $2.00 discount to vehicles that enter a parking garage before 7:30 a.m. or leave after 7:30 p.m. and stay for at least 3 hours (for a total discount of up to $4.00). The discount is designed to encourage travel outside of peak congestion periods. Numerous other cities charge taxes that are a percentage of parking fees paid by drivers, including Cleveland at 8 percent, Santa Monica at 10 percent, San Francisco at 25 percent, and Pittsburgh at 37.5 percent, the nation's highest (Alleghany Institute 2011). The taxes do not affect parking lots where parking is provided for free.

Selecting an appropriate fee or tax rate must be done carefully. Richard Voith developed a model that identifies parking tax rates that maximize central business district (CBD) size and land values (1998). His model showed that appropriate parking taxes can increase land values and community size and that failure to charge a tax may result in excessive congestion, which reduces community size and land value. However, if taxes are set too high the result will be lower congestion but smaller CBDs and lower land values. Additionally, transaction taxes may encourage some employers to move from paid parking to free parking in order to avoid the tax.

Unlike most user fees and taxes, facility-owner fees and taxes can impact parking facilities even if parking is offered for free. However, fees charged based on number of parking spaces or surface area remain relatively uncommon in the United States. The fees have been successfully implemented in Sydney, Perth, and Melbourne in Australia. Sydney charges a flat fee per parking space, Perth charges a variable fee based on use, and Melbourne charges a fee only for spaces that are designated for long-term use. All three cities charge an annual fee; however, fees could also be charged at the time of construction or issuance of a use permit. If annual fees are charged they can be collected with property taxes or individually. Calculation of fee amounts can be made using data from tax databases, data from storm water agencies that collect information on impervious surface area, site visits, and aerial photographs. Excluding properties that charge minimum parking rates from the taxes can encourage pricing of lots that would otherwise be free.

Feitelson and Rotem argue in support of taxing surface parking (2004). They suggest that a "flat surface parking tax should be considered as an alternative to minimal (or maximal) parking requirements" and note that, "A flat parking tax will clearly raise the cost of providing surface parking" (Feitelson and Rotem, p. 324). At least some of the increased cost will be passed on to users in the form of higher costs, which will affect parking patterns. Unfortunately, it is not clear what percentage of a parking tax will be passed onto employees (Calthrop et al., 2000). For parking taxes to affect the behavior of commuters, they must be passed onto the commuters (Gerard et al., 2001). Therefore, the effectiveness of parking taxes may be limited depending on the response of employers.

4.4 IMPLEMENTATION

To help employers implement commuter parking strategies, numerous tools and references exist, some of which were cited previously. This section focuses on implementation options and considerations for municipalities and States wishing to encourage employers to implement cash out and transportation allowance programs, encourage developers and property managers to offer unbundled parking, or institute parking fees or taxes.

California has been the most aggressive State when it comes to the implementation of commute options programs. In 1992, the State passed a parking cash-out law that requires employers with 50 or more employees in air basins designated as non-attainment areas and that provide subsidized parking to their employees to instead offer a cash allowance in lieu of the parking space. The law does not require that employers provide a commute subsidy of any type nor does it require them to raise the cost of parking—it simply requires that employers choosing to subsidize parking also offer a choice in their benefits package, thus removing some of the incentive to drive. A related California code requires cities or counties to grant appropriate reductions in parking requirements to new and existing commercial developments that offer parking cash-out programs.

Fairfax County, Virginia, encourages parking cash out and unbundled parking programs during the development review process. Certain developments are required to implement transportation demand management (TDM) programs and obtain specified vehicle trip reductions. TDM plans must be submitted to the county prior to development approval, and development proffers guarantee that promised cash out and unbundled parking programs (and other TDM strategies) are implemented. This policy is relatively new, and its long-term benefits are not yet known. Many other communities throughout the United States require developers and employers to implement TDM plans; however, inclusion of cash out, transportation allowances, or unbundled parking programs is typically voluntary.

San Francisco encourages unbundled parking through low parking maximums. In downtown San Francisco developers can build only 0.75 parking spaces per housing unit and that number drops as low as 0.5 in some neighborhoods. Preventing developers from constructing at least one parking space per housing unit can be a big inducement to unbundle parking at residential units. In such cases, developers failing to unbundle parking would be left with the unappealing prospect of having to sell or lease units that are guaranteed to lack access to off-street parking.

The mechanism through which parking taxes and fees can be implemented will vary by state and local government. The process should be well known to government officials, but careful consideration is recommended. The Ontario provincial government unsuccessfully attempted to implement a commercial concentration tax, similar to a property tax, that affected large-scale, paid-parking facilities. The tax had the adverse effect of causing those controlling suburban parking facilities that had charged low fees to discontinue those fees to avoid the tax. In most cases the tax exceeded the earned parking revenue, which made it cheaper for parking facilities to stop charging for parking than to pay the tax. This resulted in the majority of the tax's revenue being generated in the Toronto CBD where the tax represented a small cost in proportion to total parking revenue. While tax funds were coming primarily from the CBD they were being spent outside of Toronto, causing significant discontent. These negative impacts were not anticipated and the law was quickly repealed (IBI Group, et al. 2000).

When implementing commuter parking pricing strategies, government agencies need to consider a number of items that are described below.

- Any new policies should be developed in coordination with developers and employers.
- Many communities have regional or local commute options agencies that can assist with strategy development and program implementation.
- Developers should not be forced to construct and maintain more parking than there is demand for. The policies that fail to assure this will force developers to work to simultaneously reduce parking demand while financing and maintaining unused parking spaces. As is the case in California, developers should be allowed to decrease the number of available parking spaces if demand decreases.
- Parking cash-out policies are likely to create spill-over effects if nearby parking is not restricted or priced. Some sites have documented that occasionally employees who accept a parking cash out continue to drive but park in a nearby neighborhood where parking is free. Employers can help address this externality by developing policies that prohibit cash-out recipients from parking in residential neighborhoods and revoking program eligibility for employees who fail to comply. Government agencies can help address this issue by following the model of California's cash-out law, which explicitly allows employers the ability to revoke eligibility when employees fail to comply with company established cash-out guidelines. Charging or requiring permits for parking in affected residential neighborhoods, as discussed in the Residential Parking Permit section of this primer, can also address the issue.
- Programs must recognize that most employees will occasionally need their vehicle for errands before work, at mid-day, or after work and should provide parking options for these individuals. This can generally be done by providing commuters with a limited number of free parking days or allowing them to purchase parking on a daily basis.
- All programs should include measureable performance goals that are tracked after program implementation.

An effectively implemented commuter parking pricing strategy can reduce vehicle trips. The strategies discussed assign a value to parking that would otherwise be free or offered at an artificially low rate to the user. Overall, commuter parking pricing strategies offer some solutions to address the market distortions created by the supply of free commuter parking.

5.0 Preferred User Accommodations

Successful implementation of new parking pricing policies requires that cities address special parking needs and priorities that can undermine cities' ability to manage their overall parking system effectively. The preferred user accommodations reviewed in this section include residential parking permits, commercial loading, disabled parking, government employee parking, and car sharing.

Residential parking permit policy has seen little innovation, but a few programs show that on-street parking in affected neighborhoods can be better managed. Commercial loading zones, often free of both cost and time limits, have been known to fill, leading to double parking that blocks traffic during peak business hours. Special strategies or tools for disabled parking are important for improving access for the disabled, but fraudulent use of parking placards can monopolize spaces in high-demand areas, contributing to congestion, poor parking availability, and cruising for parking. Free government parking passes are a common benefit for public employees; however, this benefit impedes parking management by encouraging single-occupant vehicle commutes and the overuse of limited parking spaces in congested central civic locations. Allocation of parking for car-share vehicle storage is a recent consideration that is being addressed differently across the United States. Traditional exceptions to parking rules for preferred users, often meant to be small-scale solutions, have, over time, had large-scale implications and need review and reassessment.

5.1 RESIDENTIAL PARKING PERMITS

Photo credit: City of Boulder

The goal of residential parking permits (RPP) is to protect neighborhood parking by limiting its use to residents of a defined area. Innovation with RPP has been slow to evolve, especially when compared to the amount of innovation with other preferred user parking accommodations discussed later in this section. This could be the result of legislation found in many communities and some States that restricts the price of permits to the actual administrative cost of their issuance. Annual residential parking permits are $100 in San Francisco; $35 in Washington, DC; $25 in Chicago; and free in Boston. Cities have experimented with RPP by implementing various restrictions that range from the number of parking passes a household can receive to what types of households are eligible to receive a residential parking pass. Several cities limit the number of passes per household, which reduces the potential for abuse (e.g., residents reselling extra passes).

Aspen and Boulder provide examples of the monetization of excess residential parking spaces. While neither city charges its residents market-rate fees for parking permits, each city has found that it can monetize excess capacity in the neighborhoods and does so by allowing visitors to purchase parking passes. Aspen sells daily visitor passes for $7.00 and monitors parking occupancy rates to assure that sufficient parking capacity exists for neighborhood residents. (This program is discussed in more detail in the Case Studies section of this primer.) Boulder offers quarterly commuter parking passes that are good in residential parking zones. Area commuters who work in Boulder's downtown core are allowed to purchase these passes (City of Boulder, 2012). While the program has had success in maximizing the city's parking potential, at no harm to its residents, the guest-parking program currently has a wait list, indicating that its price does not reflect its true market value.

Cincinnati is considering applying advanced pricing and management principles to its residential parking. The CUF Neighborhood Association, which represents the Clifton Heights, University Heights, and Fairview neighborhoods, formed a committee in 2010 to address oversubscribed on-street parking and the excessive circling and congestion that result. The committee has completed its proposal to manage roughly 3,000 on-street parking spaces. Authority would be given to the Department of Transportation and Engineering to set both monthly residential permit prices and short-term meter prices to achieve an 85 to 90 percent occupancy rate. Prices would be set to be somewhat more favorable to residents than to short-term visitors.

Despite these advances, additional innovation is needed in the realm of RPP programs. Residents are being offered access to a community asset at little or no cost. In addition, the issuance of RPPs does not guarantee that access is maintained. Many cities refer to RPPs as a "hunting license" due to the limited availability of parking spaces, especially in high-density areas. The alternative to using RPP pricing to curtail parking spillover onto the curb in high-density residential areas, such as the above-noted Cincinnati proposal, is the imposition of minimum parking requirements, which raise housing prices by many tens of thousands of dollars per unit. Policies that improve neighborhood access, and recognize the true value of curb parking in residential neighborhoods need to be pursued.

5.2 COMMERCIAL LOADING

Delivery parking for commercial vehicles is at a premium on busy urban streets in the United States. In business districts, on-street commercial parking is seldom adequate to fully satisfy the volume of deliveries in a single day, and yet this finite resource is largely provided for free. The failure to supply and price commercial parking adequately impacts the mobility of cars, buses, and pedestrians alike, as delivery trucks will often park illegally if a space is not available. What results is a rippling effect of double parked commercial vehicles, cars, and buses taking over bike lanes combined with illegal curb parking that invades pedestrian space and blocks pedestrian crossings. Commercial loading zones and delivery parking are an essential component in any parking management plan; increasing availability and decreasing demand are two essential strategies that will alleviate congestion and improve service. Parking pricing can be an effective tool to encourage turnover of spaces and off-hour deliveries.

New York City implemented a pilot program along congested Midtown streets in 2000 to address commercial loading issues. The pilot was successful and subsequently expanded to include Chinatown and all commercial areas in Manhattan between 14th and 60th Streets. The program replaced unpaid commercial parking with hourly metered rates for all commercial loading zones and used an escalating pricing scale: the first and second hours cost $2.50 each and the third hour costs $4.00 (Schaller et al., 2010). Pre- and post-program measurements found an average reduction in minutes parked from 160 to 45, with only 25 percent of all commercial vehicles parking in the same space for more than 1 hour. The program has been particularly successful at improving mobility on narrow cross-town streets, which are commonly rife with double-parked vehicles and blocked traffic. The program is supported by the commercial delivery industry and has shown that escalating pricing is an effective tool for encouraging commercial parking turnover.

Photo credit: City of Seattle

New York City implemented an additional pilot program in 2009 to encourage commercial deliveries outside of regular business hours. The program targeted large freight companies with a demonstrated commitment to sustainability and that exceeded 100,000 trips per day into Manhattan (Solomonon & Gastel, 2010). The goal was to shift deliveries to times between 7:00 p.m. and 6:00 a.m., thereby reducing street congestion and illegal curb and double-parking practices. Originally eight delivery companies and 20 of their client businesses participated in the program; on-time delivery to first stops improved by 75 percent. Further results found carriers were able to save on fuel costs and time by making more total deliveries in off-hours. Businesses benefited by being able to focus staff time on customer service during peak business hours rather than on processing deliveries (Cassidy, 2010).

Philadelphia has taken alternative measures to address parking and congestion problems related to commercial vehicle deliveries. First, Philadelphia created commercial loading zones that allow deliveries on main streets from 6:00 a.m. to 10:00 a.m., with afternoon deliveries delegated to side streets. Designated loading zones were allocated only for delivery vehicles during morning hours but open to general parking later in the day. Then, to let commercial operators know that enforcement would be implemented, the city purchased vehicles capable of towing delivery trucks. Philadelphia stresses enforcement policies, and being able to tow delivery vehicles has greatly improved parking compliance among commercial vehicle drivers.

5.3 DISABLED PARKING

Photo credit: FHWA

Free disabled parking has been accepted practice in the United States for decades running; however, increased demand for parking, increasing occurrences of disabled placard abuse, and a general need for better parking management by cities has many rethinking the paradigm of free and unlimited parking benefits for disabled persons. During most of U.S. history, access to basic services was a daily challenge for individuals with a disability; public transit rarely accommodated wheelchairs, and parking spaces were often too far from services for disabled people to access easily. An attempt was made by policy makers during the post-World War II period to alleviate these barriers by allowing free parking without time limits at street meters to individuals with a disability. The sole requirement was that disabled persons register and display official placards, license plates, or other disabled identification documents while parking. These policies were enacted from coast to coast and often at the State level.

The American's with Disabilities Act of 1990 (ADA) ushered in a new era of increased accessibility for disabled persons. Public transit now is required to accommodate the needs of the disabled population, and off-street parking facilities must allocate 2 percent of total parking spaces for individuals with disabilities. ADA accessibility standards for transit and off-street parking are explicit; however, street and metered parking standards are vague. This vagueness has allowed free parking for disabled persons to remain a national standard practice.

As a result, the free parking benefit has made disabled placards a desired commodity, opening the door to abuse. In addition, since the inception of the ADA parking benefit standards, the definition of "disabled" has expanded, yielding a greater number of drivers who qualify for this benefit. Conversely, the stock of metered parking spaces, especially in dense, high-demand areas, has remained relatively constant. Many localities are now experiencing a disproportionate number of disabled drivers compared to the overall number of registered vehicles. The California Department of Motor Vehicles reported a 350 percent increase in the number of disabled placards issued in 2010 compared to 1990, a rate that is far higher than the population growth rate (Lopez, 2012).The baby boomer generation, now reaching retirement age, will only add to the total number of disabled drivers.

Beyond the expansion of eligibility, recent studies throughout the country have documented the fraudulent abuse of disabled parking by people without a disability, who are parking for free and without time limits in the most convenient and desirable parking places. In 2011 the City of Seattle published a report indicating that 30 to 40 percent of metered parking in its downtown core was occupied by vehicles displaying disabled parking placards (Seattle Department of Transportation, 2012). Violators see the value of free parking, especially in high-demand areas, and therefore use either a family member's or friend's placard illegally; additionally, placards of deceased persons are seldom collected, presenting another opportunity for fraudulent use. This abuse of disabled parking benefits affects disabled people and their ability to access services no differently than the population at large.

Parking experts are thinking anew about parking benefits for disabled persons. The goal of accommodation is still at the forefront, but with the understanding that this should not be allowed to interfere with the effectiveness of parking management strategies. Variable pricing and additional parking strategies will have limited impact if 10 to 40 percent of high-demand, metered spaces are occupied for an indefinite amount of time, at no cost, by drivers with disabled placards. Unfortunately, cities frequently lack jurisdiction over disabled parking. Many States, including California, Illinois, and Texas, offer disabled parking benefits as a statewide policy, leaving local jurisdictions with a limited ability to manage disabled parking.

Arlington County, Virginia, was one of the first communities nationwide to address disabled parking placard abuse and its impact on effective parking management. During the late 1990s, Arlington had a problem of low parking availability due to excessive and fraudulent placard use. The Arlington Disabled Commission approached Arlington County asking it to address these problems and offered support for the elimination of free metered parking altogether. According to an Arlington County parking manager, community support was garnered from inception, and local officials could therefore engage State officials in an attempt to revise State disabled parking ordinances, a necessary step as Virginia State law limited local jurisdictions' power in managing disabled parking. Through this process Arlington, and therefore other Virginia municipalities, gained greater flexibility and enforcement ability with regard to parking management practices. With the necessary structural changes in place, Arlington County rolled out its "All May Park, All Must Pay" program in 1998, which stopped all-day fraudulent use of disabled placards. Drivers with a placard were required to pay for parking but were allotted twice the time period to access services.

The District Department of Transportation (DDOT) in Washington, DC is building from Arlington's program and implemented a disabled parking pilot program in 2012. The goal of the program is to create better access for disabled persons. The District's old policy allowed disabled drivers to park for free at meters District wide (District Department of Transportation, 2012). Under the pilot program, a total of 400 meters, the domes of which are painted red to be visibly different from regular meters, provide two spaces per street block for better access for disabled drivers in commercial zones. Only disabled individuals displaying official placards are allowed to park at these red-domed meters. For the first time disabled drivers in the District will be charged to park, but with the new

meters they will be allotted twice the amount of parking time for the price. By replacing free parking, the program aims to discontinue the prime incentive for abuse, according to the DDOT. As a part of the pilot effort, District-wide informational campaigns were conducted by DDOT staff to elevate awareness about the change.

The State of Michigan has also implemented a change in its law, allowing only those individuals in a wheelchair or unable to operate street meters to qualify for free metered parking. All other disabled persons are allowed to park in handicapped spaces in off-street facilities. Prior to the law change, 500,000 disabled parking placards were in circulation, and each holder was allowed to park for free. After enactment of the new law, only 10,000 people, or 2 percent of the previous 500,000, were allowed to park for free. The Michigan law gives free parking only to those most in need, requires a doctor's certification with the application process, and uses a new yellow placard, a clear differentiation from the traditional blue disabled badge (Fusco and Maloney, 2012). Illinois State officials have initiated similar legislation that would revise the qualifications for free disabled parking in metered on-street spaces beginning in 2014.

States and cities are also increasing the penalties for placard abuse. The State of California granted municipalities the authority to increase fines for placard abuse from $250 to as much as $1,000. Beginning in 2012, Chicago began issuing fraudulent placard users fines, ranging between $500 and $1,000, while simultaneously impounding their vehicles at an additional cost of $1,500 to $3,000. Furthermore, people with a registered placard can be charged a $200 fine for allowing others to use their placard to park for free (City of Chicago, 2011). Each of these fines, noticeably more severe, are intended to deter people from misusing placards to park for free.

Best practices pertaining to disabled parking include:

(1) Verifying whether State legislation exists and, if so and it prevents implementing best practices, working to make changes;

(2) Determining what parking managers are legally allowed to do;

(3) Increasing fines (if parking managers don't have legislative approval to charge for parking);

(4) Eliminating free parking completely, limiting it to those in wheelchairs or who are unable to use a meter, or doubling the amount of allowed time.

Most importantly, parking managers should coordinate with the disabled community and seek its approval and support for any changes.

5.4 GOVERNMENT EMPLOYEE PARKING

Free parking benefits for government employees can easily undermine a city's transportation goals, particularly as parking near government offices is often at a premium. As with anyone offered free parking benefits, government employees are drawn to its convenience and economic advantage. The issue of free parking is complicated because many government employees work in CBDs where parking is in limited supply. A study was conducted in New York City to determine how free parking for government employees affects their travel behavior. The New York City Department of Transportation issues its workers parking placards that allow them to park for free at any legal, metered, on-street space while conducting official business. That study, based on 2000 Census data, found that government employees are significantly more likely to drive to work than their peers. If the studied employees drove alone at the same rate as their peer group, there would be 14,000 fewer cars entering the Manhattan CBD each day (Schaller Consulting, 2005). These findings are supported by an additional study of New York City commute behavior that found a positive correlation between government employment and the likelihood that a person will drive to work (Weinberger 2012).

Studies also found illegal parking by employees to be a common occurrence throughout busy civic areas, negatively impacting pedestrian safety, economic activity, emergency vehicle access, and public perception of government employees (Schaller Consulting, 2006).

There has been some discussion of addressing employee parking issues in New York City by offering employees recurring cash payments to relinquish their parking placards. This would be the equivalent of a parking cash-out program. It would be possible to price the cash out at a value lower than the revenue currently lost from employees parking at meters that could otherwise generate revenue. Another option that has been discussed is to offer employees in-car meters loaded with a negotiated value that allow employees to park throughout the city. The meters would be an employee benefit that would replace parking placards that offer unlimited free parking.

San Francisco has revised its employee-parking benefits as part of its larger parking program adjustments. In one initiative, San Francisco Municipal Transportation Agency (SFMTA) employees, many of whom were parking for free at off-street lots attached to various facilities (e.g., bus yards), lost the privilege to park for free. All SFMTA employees must now pay to park unless the right to free parking is in their labor agreement. In a second initiative, all city vehicles lost their exemption from paying meters and adhering to parking time limits. A few exceptions exist for vehicles such as police, fire, and maintenance.

The City of Austin, Texas is initiating a pilot parking cash-out program in the spring of 2012 in lieu of free employee garage parking. The goal of the program is to reduce peak traffic congestion and increase the availability of visitor parking. The volunteer program, with a one-year budget of $40,000, allows all 450 downtown city employees to register and receive a $50 a month incentive for leaving their car at home. Employees are offered a free Capital Metro transit pass, guaranteed rides home in emergencies, and personalized commute assistance. Downtown city employees currently are able to park for free at the Austin City Hall garage, which is leased by the city at a cost of $150,000 annually, or $100 per space per month (Coppola, 2012). The program goal is to encourage 100 employees who drove to work alone to commute to work differently, minimize downtown traffic congestion, promote transit alternatives for city workers, and increase visitor parking. The city will monitor employee compliance by requiring employees who drive and park to sign-in.

5.5 CAR SHARING

Car sharing is growing quickly in the United States. Users sign up for a membership and are able to rent cars for short time periods with gas and insurance included in the cost. Cars are stored in numerous locations throughout cities, and various methods are used to allow members to gain access to and start the vehicles. Car sharing differs from typical rental car services in that vehicles can be rented for a short period, as little as 30 minutes; vehicles are not stored at a central location; rental fees typically include gasoline and insurance; and users are typically required to purchase a membership. Zipcar, Hertz, and Enterprise operate car sharing nationally, while numerous smaller agencies or non-profits provide service to limited geographic areas.

Photo credit: City of Hoboken, NJ

It is estimated that one car-share vehicle can remove four to five vehicles from the road (Millard-Ball et al. 2005, 4-7). Unfortunately, finding locations where car-share vehicles can be stored between uses can be a challenge for both cities and car-share operators. Cars are typically stored in three types of locations:

(1) Within residential developments;

(2) In off-street commercial facilities; and

(3) On street.

Depending on the types of facilities it owns, a city can control access to all three of these locations. Options that cities can take to assure that parking spaces are available to car-share vehicles for storage between users are discussed below.

Supplying parking within residential developments is a relatively straightforward process for cities. In areas where car sharing exists, developers may seek out car-share agencies when constructing new residential buildings. The presence of a car-share vehicle can provide a marketing advantage, and contracting for car share earns a builder three points toward a Leadership in Energy and Environmental Design (LEED) designation. Unfortunately, not all cities have updated their zoning codes to allow car-share vehicles to be parked in residential buildings' parking areas. Making this change is a first step for any city seeking to encourage car sharing. Some cities have gone a step further and require developers to allocate parking spaces for car-share vehicles, but developers are typically not required to make the spaces available for free. Larger car-share agencies can provide sample ordinance language to cities seeking to update their zoning code.

When it comes to purely commercial parking facility operators and owners, cities have taken few actions to encourage the allocation of parking spaces for car-share vehicles. Zoning codes generally do not need to be changed to allow this, and the private market has shown itself to be capable of meeting demand. Car-share operators typically seek to park a large number of vehicles in a city and can therefore seek rate discounts by working with a particular parking operator.

The allocation of on-street parking is where cities have significant control. Two primary models have been developed by cities to allocate on-street parking to car-share agencies. The most used model is to designate on-street spaces for car-share vehicles and allow car-share operators to apply for those spaces. Portland, Oregon, works with the local car-share agencies to identify areas with demand for car sharing and available on-street space. Signs are installed to designate on-street spots, which are then allocated to the various operators at no cost. Pittsburgh, Pennsylvania, uses a similar model, but rather than providing the spaces at no cost, it charges a minimal fee.

The second model is to designate on-street spaces and auction them off to the highest bidder. In communities where multiple vendors compete, it can be difficult to decide who gets which spots, which this model can help address. Washington, DC makes operators bid for available parking spaces. Unfortunately, a successful auction process requires the presence of multiple bidders. If a car-share operator knows that a competitor will not want a space, it can provide a low bid to the city and secure the space at a very small cost. Thus, if this model is implemented to maximize a city's revenue, it may not accomplish that goal.

Regardless of the model chosen, cities that allow car-share vehicles to be placed on blocks where street sweeping is in place can require car-share operators to clean the street below and around the vehicle. This addresses the likelihood that a car-share vehicle will not be moved when street cleaning occurs.

Another consideration is that the allocation of on-street spaces in neighborhoods where parking demand is high may generate a negative community response. Hoboken, New Jersey implemented a Corner Cars program in which spaces on key corners throughout the city were designated for car-share vehicles only. The city suffers from a general shortage of on-street parking and public reaction to the set aside of spaces was negative. It is likely that other communities would experience similar concerns if they allocate on-street parking to car-share vehicles in high-demand areas. It may be possible to mitigate that concern by educating the public regarding the potential of car sharing to reduce parking demand.

Overall, the model for allocating car-share spaces is well developed within the private market. Cities need to do little in this area other than make sure it is legal for developers to allocate parking spaces for car-share vehicles. Allocation of on-street spaces is more difficult in areas where multiple car-share operators compete. Cities experiencing such competition and wishing to allocate on-street parking to promote car sharing need to identify an effective process through which spaces can be allocated among competitors.

Public Acceptance 6.0

Innovative parking pricing policies that do not gain political or public support either will not be enacted or will be quickly repealed. Taking the time to develop and implement an effective communication strategy, outreach plan, and, potentially, marketing plan, will go far toward advancing program goals and reducing the stress placed upon parking managers and planners. Inadequate outreach efforts may lead elected officials and parking managers to be blindsided by public opposition and leave them unable to respond adequately to complaints raised by vocal critics.

This section of the primer discusses the steps involved in the creation and implementation of an effective outreach plan. Depending on the type of pricing program being implemented, it may not be necessary to implement all of the steps discussed, but it is best to err on the side of extra community input and outreach to identify and address community concerns and develop a network of strong supporters. The sidebar on Ventura, California, discusses how unanticipated public concern can quickly force a city to repeal portions of a newly implemented, well thought-out parking policy. Conversely, SF*park*, whose outreach policy is discussed briefly, offers an example of a program that significantly changed parking policy and pricing without generating negative public reaction.

6.1 DEVELOPING A STRATEGY

The first question to ask when developing an outreach strategy is, "What problem is your parking policy trying to address?" Hopefully, this answer was developed with community input during the planning process. The answer to this question will help planners identify stakeholders and guide messaging decisions.

The target audience, or stakeholders, will likely consist of elected officials, commuters, residents, merchant groups, visitors, and neighborhood groups. Special attention may be needed to reach some stakeholders, such as older and disabled residents or those who do not speak English. From within the target audience it is necessary to determine who the decisionmakers and influencers are: decisionmakers are typically elected officials whose votes are needed to start or fund a program, and influencers are heads of merchant and homeowners' organizations, business leaders, advocates, and other individuals who can influence political decisions and public opinion. Influencers should be among the first people contacted. After the target audience has been identified it may be beneficial to track all communications with this audience. It is advisable to use a database to store information on contact names, areas of interest, and the communications that occur. In addition, a mailing service should be used that allows people to subscribe and unsubscribe to notifications and information. The database and mailing service should, ideally, be integrated and maintained throughout the outreach effort.

Attitudes and perceptions on the part of the target audience toward the parking project or policy should be assessed. This can be done with surveys, one-on-one interviews conducted in person and over the phone, door-to-door outreach, informal focus groups, small meetings with invitees, and attendance at merchant and neighborhood meetings. Stakeholder concerns and desired outcomes should be identified during this initial process, which is meant to develop trust with stakeholders and to gather information that can be used to develop a marketing message and tone. If the outreach process succeeds at building trust and leads to a constructive relationship with staff, stakeholders could subsequently be called upon to help address unanticipated concerns or objections that may arise during or after implementation of a new policy.

6.2 CREATING A MESSAGE

Effective messaging is important to public acceptance. Some time should be spent strategizing messaging prior to working with stakeholders, whose input can then be used to test and refine ideas. Simple, consistent messaging needs to be developed that resonates with the community. SF*park* defined its message with the following points:

1. SF*park* makes parking more convenient.
2. Reducing circling and double-parking benefits everyone.
3. SF*park* uses demand-responsive pricing to open up parking spaces on each block and ensure available spaces in city-owned garages.
4. SF*park* charges the lowest possible rate to achieve the right level of parking availability.
5. The SFMTA's primary goal with the project is not to raise parking revenue but to make the transportation system work better for everyone.

Photo credit: SF*park*

SF*park* marketing materials and community outreach stuck very closely to the above messages. Other messaging examples include:

- Reinvesting revenue in the community;
- Making sure space is available for customers;
- Making parking easier;
- Providing more time so that visitors can stay longer;
- Reducing accidents;
- Improving walkability;
- Helping transit become faster and more reliable; and
- Improving economic competitiveness and vitality.

In addition to defining a message, it is also necessary to decide on a tone for marketing materials. The tone of marketing efforts should be appropriate to the community, audience, and project.

6.3 MARKETING

Once a message and tone have been established, it is time to develop marketing materials. The types of materials developed will vary based on budget, target markets, chosen distribution channels, and level of change being sought. Minor programmatic or policy changes are unlikely to require a large marketing effort; however, programs such as SF*park*, in which a new concept in on-street parking is introduced in combination with new parking assets and enforcement regimes, require significant education and outreach.

A number of options exist for distributing marketing materials and disseminating messages. Low-cost but effective options include bus-shelter signs; municipal bill inserts; bus wraps; Web sites; emails; radio; flyers left with merchants; door-to-door outreach; press releases; press events; and social media including Facebook, Twitter, and YouTube. In some communities it may be necessary to develop marketing materials in multiple languages. This determination can be made based on city policy, analysis of census demographic data for the impacted area, and feedback received during the outreach stage. For significant changes the visual design of marketing materials will ideally extend to physical parking assets, garages, and off-street parking lots.

Supporters and influencers should be called upon during the marketing phase of the project to discuss actively the benefits of the proposed parking policy with community stakeholders and political leaders. Many individuals within the community may not take the time to understand the details of the proposed parking program. Instead, they will seek the opinions of other community members or try to determine the general level of support within the community. If a vocal minority is able to create the appearance of opposition, the opinions of less informed community members may also turn against the project. Supporters and influencers can help a project avoid this fate.

6.4 TRACKING

Marketing efforts should be monitored and tracked. Specific goals should be identified against which the success of marketing efforts should be measured. Examples may include the number of Web site visits, Twitter postings, "likes" to a Facebook page, newspaper articles published, and community meetings attended. Monitoring progress toward marketing goals facilitates making adjustments to correct an underperforming marketing plan.

After a program has been approved and implemented, communication with community stakeholders should be maintained. This will ensure that parking managers are able to address any concerns that may arise and maintain community connections and trust for the next time a policy change is pursued.

Ventura, California

Ventura, California, offers an example of the negative response that can occur to a parking policy change and how a city can successfully respond. In 2006, the city published the Downtown Ventura Mobility and Parking Plan, which verified that there was a downtown parking problem: peak parking occupancy exceeded 93 percent on Saturdays and occupancy was greater than 85 percent during 8 of 11 monitored hours. The plan recommended pricing strategies, time restrictions, parking benefit districts, and a series of transportation demand strategies.

Throughout the planning and implementation process, the city conducted a series of community outreach events, held merchant meetings, distributed print advertising, and conducted door-to-door outreach to discuss and inform residents and merchants about the benefits of parking strategies, including pricing, and the challenges facing the community that such strategies are designed to help overcome. They also asked merchants to speak with customers.

The implementation of pay stations was delayed from 2007 to 2011 to ensure the community was on board. To further garner public acceptance the city assured citizens that every dollar of parking revenue would go back to the downtown. The city also made the wireless Internet signal used to support the parking meters available at no cost to downtown computer users. City-owned or leased parking lots remained free, and additional signage was added to direct downtown visitors to these free parking locations.

Of the 2,915 public parking spaces in downtown Ventura, the city implemented pay stations for 342. The first strategy was tiered rates: $1.00 per hour for the first two hours and $1.50 per hour after the first two hours.

In October 2010 the system was reviewed and showed parking utilization dropping to 85 percent on Main Street during the midday and evenings. Unfortunately, businesses that were struggling due to the economy began to blame the parking meters for bad business and some customers found the tiered rates confusing. Local newspaper articles and blogs stated a dozen downtown business owners faced double-digit sales declines since the meters were initiated. At a merchant meeting, hosted by the mayor, businesses complained that the meters changed the welcoming nature of downtown and said that customers did not like the meters and struggled to use them.

Responding to these concerns, pricing was simplified with the removal of tiered pricing, a 4-hour limit in one parking lot was removed to allow employees more parking options, using loading zones was made free, and evening parking continued to be free. To further encourage public acceptance the city handed out 50,000 1-hour free coupons during the holidays, 14,000 of which were used.

While some vocal opposition remained to the parking policy changes, recent municipal elections favored candidates that supported the meters and most merchants report that they appreciate the new parking turnover, allowing easier curbside parking for customers on Main Street. The city continues to use the data from the meters to make determinations for future pricing adjustments and will use this data to provide information to the merchants and the community about the results of parking pricing downtown.

Case Studies 7.0

ASPEN, COLORADO

The City of Aspen is a well-known resort community in Colorado and offers an informative example of a town that has implemented paid, escalating parking charges; integrated numerous payment technologies; funded commuter programs with parking revenue; and priced parking in RPP zones. The town's population is relatively small, but its scenic location, access to multiple ski resorts, and high-end shopping and dining make it a major tourist destination. Faced with a significant number of vehicle trips, limited roadway and parking capacity, and a desire to reduce the environmental impacts associated with vehicle travel, the city turned to numerous parking management strategies to reduce vehicle trips.

Aspen implemented paid parking in its downtown in 1995 to increase parking availability. City planners recommended an hourly rate of $1.00, time limits of 2 hours, and residential parking permits to protect adjacent neighborhoods. It was further recommended that the parking changes be implemented concurrently with a doubling of bus service, expansion of high occupancy vehicle lane miles, and the establishment of convenient, mid-block pay stations and in-car meters. This plan generated a significant amount of negative public reaction. In response, the city council, while approving the plan, agreed to put it to a vote via a binding public referendum, but only after paid parking and the plan's other elements had been in place for 3 months. When the vote occurred, 75 percent of voters supported continuation of the program.

The manner in which Aspen handles its RPP zones is unique. The zones were created to prevent overflow parking from the city's downtown core. Residents are provided with parking permits and visitors are allowed to park for free for up to 2 hours in an 8-hour period. Those two policies alone would result in occupancy rates below 85 percent. To assure that its on-street parking facilities are appropriately utilized, the city allows visitors wishing to park for more than 2 hours to purchase $7.00 day passes at a local grocery store, through a pay-by-phone service, or at any of the 15 pay stations located within the neighborhoods. Businesses within the RPP neighborhoods are allowed to purchase business vehicle permits. Each permit can be used in any vehicle and costs $1,000 per year. Lodges within RPP neighborhoods are eligible to purchase parking permits for their guests' use. Employees at lodges were using the permits for personal parking, however, forcing the city to implement a "two strikes" policy in which any lodge whose employees are caught twice abusing the program are banned from participating; this dramatically increased compliance.

The city regularly monitors parking availability in residential neighborhoods. If average occupancy in the neighborhoods exceeds 85 percent over a 1-year period, rates are increased.

As the downtown parking policy matured, it became apparent that many visitors wanted to park for more than 2 hours. This demand was met through the implementation of a progressive rate structure that extended parking limits to 4 hours. The cost of the first 2 hours remained unchanged and drivers were allowed to purchase an additional 2 hours of parking for a premium charge. By keeping the cost of the first 2 hours of parking unchanged the city was able to avoid significant negative response from the community. While some individuals expressed concern regarding the higher rates for the third and fourth hours, the ability of the program to offer drivers more options

helped garner public support. Today, the cost of parking is $2.00 per hour for the first two hours, $3.00 for the third hour, and $4.00 for the fourth hour, with the average parking duration being 2.1 hours. Parking fees can be paid at pay stations or via pay-by-phone.

Aspen has used and integrated multiple parking payment and enforcement assets. In its early days the RPP program relied on chalking tires, and the city's staff of five enforcement officers was able to visit each parking space only two times per week. This system was time consuming and abused by people who would move their cars short distances to avoid time limits. The city responded to these issues by implementing license plate recognition technology. With LPR the city is able to check each of its 3,000 residential-zone parking spaces two to three times per day, even after reducing its enforcement staff by one. Aspen's LPR technology uses GPS and camera data to verify violations, which allows the city to identify cars that remain within a residential zone for more than 2 hours in an 8-hour period without either purchasing a day pass or holding an RPP. The enforcement vehicles access a database with information on all residential pass holders, which has made the need for physical passes unnecessary.

For a number of years within its downtown core, the city used in-car meters that were well received by residents; however, the city's vendor stopped supporting the technology, leaving the city scrambling for a new option. Not wanting to purchase another in-car meter system, the city decided to implement pay-by-phone. The pay-by-phone technology has allowed the city to implement parking promotions that allow people to park at reduced rates during different times of the year. The leftover in-car meters were used to support the city's commercial parking program. Companies with workers that must transport goods, such as plumbers and electricians, are eligible for in-car meters that allow them to park in the downtown area for $1.00 for the first hour and $0.50 for every subsequent hour. The in-car meters will soon be replaced by the pay-by-phone technology for commercial vehicles.

WASHINGTON, DISTRICT OF COLUMBIA

Photo credit: FHWA

Washington, DC is a parking innovator, and its leaders have shown a willingness to experiment with new ideas and programs. Partnerships between city leaders, the District Department of Transportation (DDOT), and the Metropolitan Washington Council of Governments have resulted in the implementation of multiple innovative parking strategies. This case study focuses on DC innovations and lessons learned in variable parking pricing, residential parking permits, license plate recognition technology, and paid disabled parking.

Performance Parking

The District of Columbia implemented a variable parking pricing program in 2008 in response to its Performance Parking Ordinance. The goal of the program is to stimulate on-street parking turnover and reduce occupancy rates to 85 percent in targeted neighborhoods. Two zones were identified as test areas for the program: the Ballpark District and Columbia Heights. Significant amounts of data were collected to help city officials set parking rates and policies. Data collection included a parking inventory and parking count for each zone and the creation of a database to track all collected data.

Within each neighborhood, every parking space was identified, labeled, and inventoried. LPR technology was used to conduct parking counts and estimate parking duration and turnover. Data from the inventory and count were analyzed to determine the zone-wide

hourly parking profile, which detailed the parking occupancy rate per peak hour, the average duration of stay, and the extent of vehicles parking beyond legal time limits for each block. This information established the parameters of Washington, DC's initial variable parking pricing rates for its system, which uses pay stations that are able to vary rates from block to block, by time of day and day of week and for special events. (Nevers & Gray, 2009).

The Ballpark District, which is one of the pilot neighborhoods affected by the city's Performance Parking Ordinance, is home to a recently constructed baseball stadium and experiences extreme increases in parking demand during games, which makes it an ideal area to implement a variable parking pricing program. The parking profile, not surprisingly, indicated a variation in occupancy rates between game and non-game days. Initial variable rates resulted in game-day occupancy of 34 percent for blocks that had previously been at or above 85 percent occupancy. The occupancy on non-game days was reduced to 24 percent (District Department of Transportation, 2010). Occupancy data indicated that initial rates were set too high. District parking managers, over time, have adjusted rates on specific blocks to achieve more appropriate occupancy levels by block and within the neighborhood. Adjustments included changing some metered rates on game days and implementing an escalating pay rate for meters on non-game days.

Residential Parking Permits

Washington, DC has had an RPP system since the 1970s, which was introduced to ensure residents have access to street parking in their neighborhoods. With the implementation of the Performance Parking Ordinance some changes were made to the Ballpark neighborhood's RPP program. Prior to variable parking rates, visitors in the neighborhood could park for free for up to 2 hours and residents were sent one visitor-parking pass each year. Under the new program, visitors receive no free parking, and free visitor passes for residents are being abolished. In the future, visitors and residents will be able to purchase visitor passes online. Visitor license plate information will be provided when purchasing the passes and LPR technology will be used for enforcement.

Permit boundaries in the District are not determined by street block or neighborhood, but rather by the ward in which the resident lives. The entirety of Washington, DC is divided into eight wards, allowing residents to travel within their ward and use on-street parking for free. In addition, RPPs cost only $35 per year, a cost significantly below market rate and one that does not discourage residents from using on-street parking. Large zones with cheap residential parking leads to over saturation of cars in many neighborhoods, causing many complaints, but thus far no citywide policy solutions have been adopted.

License Plate Recognition Technology

On the technology front, Washington, DC has begun widespread use of LPR technology to help determine parking occupancy rates and enforcement. LRP information can be referenced against a database containing violation, payment, and other pertinent enforcement information. Moreover, LPR technology is able to determine parking duration and occupancy data (Lum et al., 2010). More than 250 cameras, at a cost of $20,000 each, scan license plates in real time throughout the District, which is better than one LPR per square mile, the highest concentration in the nation. The technology was first introduced in the District in 2004 and is now able to collect more than a million data inputs a month. Driven by privacy concerns, the District has wrestled with the length of time LPR data information may be stored; currently the data collected is stored for 3 years (Klein and White, 2011).

Disabled Parking

Washington, DC is attending to disabled parking in a new way, addressing access for disabled drivers and fraudulent all-day abuse of disabled placards. Desiring better compliance with the ADA standards, in 2012 the District implemented, a metered on-street parking program that, with time, will replace free parking at any street meter for disabled drivers. The program is designating two disabled metered spaces for each block in high volume areas. The goal of the program is to determine if paid disabled metered parking provides better access, encourages turnover of disabled parking spaces, and eliminates or reduces all-day fraudulent placard abuse by individuals who do not have a disability but use disabled placards to park.

Disabled meters are designed with a red dome to distinguish them from regular meters. At these meters, disabled persons displaying registered placards pay regular parking rates, but are allowed to park for longer time periods (District Department of Transportation, 2012). Shortly after implementation, the program was suspended for 90 days to address concerns raised by the disabled community and increase awareness of the program rules.

SEATTLE, WASHINGTON

The City of Seattle adopted a performance-based parking program with variable rates for its many neighborhood business districts with paid on-street parking. The process began in late 2010 when the Seattle City Council adopted a new policy that focused on measurement and technical criteria for setting parking rates. The ordinance directed the Seattle Department of Transportation (SDOT) to collect on-street parking conditions data annually and determine whether changes should be made to parking rates and hours of operation to maintain specified availability targets.

The adopted ordinance sets rates between a minimum of $1.00 per hour and a maximum of $4.00 per hour. The SDOT director has the authority to set rates within these amounts by location, time of day, and other considerations. According to Seattle Municipal Code (11.16.121) rates are set based on technical analysis to maintain one or two open spaces on each block face throughout the day in order to:

1. Maintain adequate turnover of on-street parking spaces and reduce incidents of meter feeding in commercial districts;
2. Encourage an adequate amount of on-street parking availability for a variety of parking users, efficient use of off-street parking facilities, and enhanced use of transit and other transportation alternatives; and
3. Reduce congestion in travel lanes caused by drivers seeking on-street parking.

Since late 2010, the city has conducted four comprehensive parking studies using either consultant resources or internal staff. The studies have documented on-street parking conditions manually, including occupancy by hour, duration, and presence of exempt vehicles (namely, disabled parking permits). When the program started, SDOT used the collected data to look at parking availability during the peak hour, and set prices accordingly. Various stakeholders felt that the city was setting prices based on data from too short a time period. In response, SDOT staff began to instead set prices based on data from the peak 3-hour period between 9:00 a.m. and 3:00 p.m.

In 2011, SDOT made considerable changes to rates and hours of operation based on the results of a 2010 parking study and is making additional changes in 2012 based on results of a June 2011 study. The changes have varied depending on neighborhood conditions and include rate increases, rate decreases, maximum time limit increases, and evening hour extensions. In addition, "sub-areas" have been created with different rates or time limits. This recurring analysis and adjustment process has resulted in the creation of 23 parking districts, some of which have two sub-areas with different rates and maximum time limits. Prior to passage of the performance-based parking ordinance, Seattle had three pricing zones: downtown, center city, and outer areas.

Results from the 2011 rate adjustments found that in four districts where rates were increased, occupancy subsequently dropped. In seven districts where rates remained the same, occupancy sometimes went up and sometimes went down. In the eleven districts where rates were decreased, there was no significant change in occupancy. The city found that in areas where parking occupancy has traditionally been low, rate reductions did not attract new parkers. The city is now testing to see if increasing parking time limits from 2 to 4 hours in low-demand areas increases occupancy. Data from SDOT's most recent price and time limit adjustments will be available in the fall of 2012.

Photo credit: City of Seattle

Since implementing performance-based parking, the city has worked to identify more efficient ways in which to collect on-street parking condition data. While the city is not currently pursuing street-sensor technology, SDOT has investigated several other ways to collect occupancy data. In one effort, SDOT is examining payment transaction data to estimate occupancy. Unfortunately, in several areas, paid occupancy is lower than actual occupancy and the difference varies by time of day and area. The primary reason for the difference is disabled permit parking; vehicles with State-issued disabled parking permits are allowed to park for free and for an unlimited period in paid parking neighborhoods.

A second data collection effort involved the use of Seattle Police Department resources. Parking enforcement officers were trained in the data collection process and used for two of the four completed studies; however, it was determined that the time they spent assisting with the parking study pulled them unreasonably from their primary enforcement task. In a third effort, SDOT tried to use its LPR enforcement equipment to determine occupancy levels, but was unsuccessful. The match between the locations of license plate reads and the paid-parking block faces was too imprecise for use in a parking study.

Throughout development and implementation of the performance-based parking process, SDOT has actively engaged community stakeholders. This has been accomplished through the creation of a Parking Sounding Board made up of a wide variety of community stakeholders who discuss and comment on changes in paid-parking rates and hours of operation. SDOT has also involved local neighborhood groups and chambers of commerce and is producing neighborhood-specific information for distribution. Going forward, SDOT is also working to identify new ways to communicate parking rate changes to the public.

8.0 Conclusion

Today, parking management and pricing appears to be on the cusp of significant, innovative, and accelerated change. Performance-based parking has proven to be successful, and cities are beginning to develop data-driven parking policies based on clear, attainable goals. San Francisco and Seattle offer examples of performance-based strategies that have earned both public and political support.

Advances in parking policy are being made possible, in part, by improvements in parking technology. New tools make it easier for cities to adjust pricing and collect utilization data. Steps are also being taken to develop database tools that integrate the information provided by parking assets from different manufacturers, which allows for the implementation of complex and user-driven parking systems. These improvements make it easier for cities to enforce parking regulations and for users to pay and comply with parking rules and fees.

Photo credit: City of Seattle

Governments are also responding to the market distortions created by free employer-provided parking. Cities are implementing both mandatory and voluntary policies to encourage employers and developers to pass the cost of parking on to travelers, who in turn are then more likely to make travel decisions that are more economically efficient. Cities are also working to address issues associated with preferred users, including the disabled, city employees, and residents. Without carefully addressing these issues it will be difficult for performance-based parking policies to function effectively.

Cities interested in implementing new parking-pricing programs will soon benefit from large amounts of data from the Seattle and San Francisco performance-based pricing programs. Seattle is closely tracking the effect of pricing on utilization and is also experimenting with expanding time limits and making changes to policies for preferred users. San Francisco is collecting a wide array of data including information on the effects of performance pricing on parking search time, double parking, parking availability, air quality, sales tax revenue, parking tax revenue, and overall user experience. Data on efforts to address preferred users will also be forthcoming from Washington, DC; New York City; Chicago; Austin; and others.

In the end, cities rarely suffer from an absolute shortage of parking. Rather, it is their management processes that are often insufficient to provide drivers with reliable parking access and information. Moving forward, cities need to think broadly when developing solutions to parking and access issues. Parking and land use are closely intertwined, and parking policy decisions affect the physical environment, livability, and economic success of a city. Parking decisions cannot be fully separated from the political process, and each city must develop a solution that is appropriate to its needs. This primer is a guide in that process. The FHWA encourages planners, politicians, and community members to seek out additional information from other FHWA documents and events, published materials, and the cities whose programs were discussed in this document.

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