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The Dynamics of On-Street Parking in Large Central Cities

Allison L. C. de Cerreño, Ph.D.

Elliot G. Sander, Director
Allison L. C. de Cerreño, Co-Director

December 2002

Rudin Center for Transportation Policy & Management
NYU Robert F. Wagner Graduate School of Public Service
4 Washington Square North New York, NY 10003
www.nyu.edu/wagner/rudincenter

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December 2002

by

Allison L. C. de Cerreño, Ph.D.

Rudin Center for Transportation Policy and Management
New York University Robert F. Wagner Graduate School of Public Service

ACKNOWLEDGEMENTS

On behalf of the NYU-Wagner Rudin Center for Transportation Policy & Management, I wish to acknowledge the assistance of the many individuals who provided their time, suggestions, data, and references toward the completion of this report. In particular, I would like to thank Tom Kadzis and Don Grabowski, who not only attended the peer-to-peer session, but spent many an hour on the phone reviewing and commenting upon various drafts of the questionnaire that was distributed to the central cities once finalized. I would especially like to acknowledge the following individuals who also gave their time to attend the one-day peer-to-peer exchange session in Boston: John Girardi, Peter Muntaner, Rick Rybeck, and Judy Steele.

While not everyone could attend the peer-to-peer session, many individuals provided data by completing the questionnaire for the study, and were available for follow up queries, including Larry Brown, Mike Cynecki, Keith Ehrensing, David Harris, Bea Hickey, Gerald Robbins, Jon Rose, Victor Rosen, Charles Ukegbu, and Chuck Whalen. Donald Shoup was also gracious enough to provide additional background information and reports on on-street parking.

Special thanks are owed to Andrea d'Amato, President of the National Association of City Transportation Officials (NACTO), for hosting the peer-to-peer session in Boston, and all those from the Boston Department of Transportation who participated at various points during the day, as well as Frances Banerjee and Elliot Sander who were instrumental in laying out the framework for the study.

Finally, the Rudin Center acknowledges the Federal Highway Administration, which provided the funding for this study as part of its Metropolitan Capacity Building Program.

EXECUTIVE SUMMARY

Parking is a critical component of transportation policy and management for any locale, but especially for the large central cities. The policies and management practices affecting parking lead to outcomes that, in turn, can affect land use, air quality, traffic congestion, travel behavior, safety, and economic development, not to mention revenue lines. Yet, effectively managing parking is an ongoing battle for the large central cities as they face competing, and sometimes contradictory, objectives along with an ever-increasing demand for space.

As important as parking is, however, there are relatively few serious analyses and assessments of parking, and even fewer of "on-street" or "curb" parking, which is of particular interest to central cities. Recognizing the need to enhance both the body of literature and an ongoing peer-to-peer exchange about on-street parking, the Federal Highway Administration under its Metropolitan Capacity Building Program, provided the funding for this study.

The purpose of the study was four-fold: (1) to identify and review comprehensively "on-street" parking policies and management practices in large cities; (2) to determine, to the degree possible, the impact that on-street parking has on transportation, development, and land-use; (3) to recommend best practice strategies for on-street parking in large cities; and, (4) to facilitate a practical exchange between cities of knowledge and problem-solving information to improve on-street parking management.

This report is the culmination of the year-long study, which included an extensive literature review, one-on-one discussions with city parking officials, a peer-to-peer exchange session in Boston, and a detailed questionnaire to which 9 U.S. cities responded (5 of which are among the 10 most populous U.S. cities, with the remainder in the top 25).[*]

Why On-Street Parking is Important

On-street parking is a key factor in promoting businesses in cities, particularly within central business districts. As a type of shared parking, on-street parking is an efficient means for allowing multiple users to reach multiple destinations. On-street parking utilizes less land per space than off-street parking and provides easy access to businesses located on city streets. For pedestrians, on-street parking creates a buffer between moving traffic and individuals walking on the sidewalks, providing a measure of safety and reducing the level of perceived noise. Further, depending upon how on-street parking is situated on a street, it can also serve as a traffic calming device, thereby slowing vehicles and potentially reducing the number and severity of accidents.

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[*] Responding cities included: Boston, Chicago, Dallas, Los Angeles, New York City, Phoenix, Portland, San Francisco, and Washington, DC. See Appendix A for a copy of the questionnaire.

However, on-street parking is not without trade-offs. The same barrier between moving traffic and individuals on the sidewalks can also create visual obstructions for both pedestrians trying to cross intersections and vehicles moving along a street, thus increasing accidents. On-street parking also competes with other uses of roadways, including additional lanes for traffic flow, bike lanes, and wider sidewalks. Further, as drivers search for open spaces, congestion on roadways is increased. Finally, on-street parking, like all forms of parking, attracts vehicles, which generates more traffic.

There is a shared belief among transportation policymakers and parking officials alike that, when managed properly, the benefits of on-street parking outweigh the negative trade-offs. However, the key is finding methods of effective management and maintenance that maximize opportunities and minimize difficulties associated with on-street parking. This report identifies some of these methods.

Framework for the Report

Section 1 begins with some background information on the project, the cities involved, the importance of on-street parking, and broad issues of concern. While recognizing the limits of the current body of literature specific to on-street parking, Section 2 places on-street parking within the larger framework of parking issues. Based in the wider body of literature related to off-street parking, Section 2 reviews how parking relates to land use, economic development, and travel behavior. Drawing heavily on the peer-to-peer exchange session and the responses to the questionnaire, Section 3 provides a comprehensive review of on-street policy, planning, management, and operations, all of which supply a foundation upon which to base further discussion and assessment about on-street parking. Touching upon a variety of topics, including pricing, curb management, meter technologies, and enforcement, Section 3 identifies areas of difficulty, gaps in information, and effective practices utilized in a number of cities. Section 4 highlights lessons learned, offers some suggestions for further study or analysis, and identifies several best practices with respect to on-street parking.

Findings and Recommendations

There were several lessons learned as a result of this study, but chief among them are the following:

- ***To effectively manage, one must know what it is he/she is managing.*** In terms of on-street parking, this translates into the need for having basic information on assets and regulations in an accessible format that can be updated and easily shared across departments and agencies. Many cities lack this basic capability.

- ***Integrating and coordinating among agencies and divisions is critical.*** Multiple agencies and divisions within those agencies are responsible for various aspects of on-street parking. While they are all connected, they are not always effectively integrated.

- ***Further research is necessary.*** One can discern the techniques or approaches used by different cities for various elements of on-street parking, but analyses of whether the various measures are effective are meager and rarely provide data over extended periods of time.

- ***Ongoing peer-to-peer exchange on on-street parking is important.*** Because the literature about on-street parking is sparse and because there is little communication among parking officials from city to city, providing a continuous and regular means for exchanging information is particularly important.

Further study and assessment is recommended for several items, as follows:

- ***Ban on cars in the Central Business District between 9am and 5pm***. Recognizing the political hurdles involved, several cities still expressed interest in banning cars in the central business districts during weekdays. Further assessment of the benefits and risks of this approach is needed.

- ***Better collaboration with suburban areas***. Cities expressed a desire for suburban residents and businesses to better understand the costs of auto use. While there is an understanding that suburban areas rely more on cars because transit is not as available, the policies in place in areas outside the city do have an impact, often negative.

- ***Database management systems.*** One of the lessons learned was that there is a need for having basic information on assets and regulations easily accessible and updatable. Most of the cities do not have such systems in place, but what system would best work is uncertain.

- ***Integration is the key.*** While integration among divisions and agencies responsible for on-street parking policy, management, enforcement, and adjudication is important, how best to achieve this is worthy of review.

- ***Meters that enforce themselves.*** Technologies already exist that allow meters to enforce themselves (automatically generating tickets, recognizing when a vehicle has left so the meter is set back to 0, or recognizing when a vehicle has exceeded the time limit so the meter cannot be fed, for example). Additional analysis and assessments are needed to determine whether they should be implemented and how best to roll them out. However, there are other technologies, like pay by phone and in-vehicle meters (see best practices), which are less expensive and likely to provide a more optimal approach.

- ***Sliding scale fee/Use of Personal Data Assistants (PDAs) to determine validity of parking permits for persons with disabilities (ADA parking permits).*** Dealing with abuses of ADA parking permits was cited by almost all the cities. How best to mitigate the problem is unclear. However, these two possibilities warrant further review.

- ***Variable message boards for on-street parking.*** More research is needed on the efficacy of signage in general. However, to deal with the problem of multiple regulations on signs or at spaces, one might make use of variable message boards which could be changed centrally at the press of a button. The technology for this already exists, and further study might be taken to determine its applicability for on-street parking.

Among the best practices identified are:

- ***Congestion/Value Pricing – New York City's Program for Commercial Parking***
  New York City's congestion pricing program for commercial parking has the makings of a best practice for the industry. The City began an incentive program in midtown to deal with commercial vehicles in October 2000. The program is win-win. For the businesses, if they receive a ticket for parking, it is a business loss; but if they have to pay for parking, they can deduct it as an expense. Also, the city sells debit cards with chips (smart cards) to the companies, which in turn give them to their drivers. The business can then track the drivers if they choose, and the

drivers need not carry cash. For the City, enforcement is much easier and streamlined, summons rates have dropped significantly, and revenues have more than equaled the investment.

- ***Meter Technologies – Free Flow Parking, Smart Cards, In-Vehicle Meters, Pay by Phone***
  Many cities are moving toward free flow parking meters and/or smart cards, and with good reason. Cities that have begun using free flow parking or pay/display meters already see benefits in terms of revenues, maximizing the number of spaces on a given street, and streamlining ticketing. Combined with smart cards, they are a powerful tool.

  For cities looking to integrate smart cards for on-street parking with other transportation modes, they will eventually offer a one-stop card for the consumer, helping to make transportation seamless from one mode to another. The potential for smart card technology is tremendous if one thinks about standardizing systems so that transportation could provide a sense of seamlessness from city to city across the country.

  Pay by phone and in-vehicle meter technologies offer additional benefits, including lower costs since cities need not pay for meters on the curb and the potential to utilize the same system in different cities across the country. The pay by phone technology, which allows customers to call a toll-free number when they are about to park and to call again when they are finished, is already being used in Seattle and Vancouver for off-street parking and is utilized for on-street parking in several European countries. In-vehicle meters, also used in many European cities as well as in Aspen and Arlington in the United States, work together with a pre-paid smart card and allow drivers to start their meter with the card and turn it off when they return.

- ***Institutional Cooperation and Collaboration – Chicago's Traffic Management Task Force***
  Chicago has a *Mayor's Traffic Management Task Force* that meets weekly to review traffic concerns related to daily operations. This consistent interaction enables greater coordination of operations.

- ***Community Outreach – Boston's Program to Involve Merchants in Turn-Over Studies***
  Boston has an educational program that involves the merchants in conducting turn-over studies. By letting merchants track the turn-over in front of their businesses they begin to better understand the importance of encouraging it.

TABLE OF CONTENTS

1. INTRODUCTION

Parking is a critical component of transportation policy and management for any locale, but especially for the large central cities. The policies and management practices affecting parking lead to outcomes that, in turn, can affect land use, air quality, traffic congestion, travel behavior, safety, and economic development, not to mention revenue lines. For example, policies that provide large amounts of unpriced parking may encourage automobile use, thereby increasing congestion. Effectively managing parking is an ongoing battle for the large central cities as they face competing, and sometimes contradictory, objectives along with an ever-increasing demand for space.

As important as parking is, however, there are relatively few serious analyses and assessments of parking, and even fewer of "on-street" or "curb" parking. Worse, because the interplay between on-street parking and other objectives (such as land use or economic development) is not well understood, policies are sometimes misguided or opportunities are missed to utilize parking in ways that could have positive impacts. Recognizing the need to develop both a body of literature and an ongoing peer-to-peer exchange about on-street parking, the Federal Highway Administration under its Metropolitan Capacity Building Program, provided the funding for this study.

The purpose of this report is three-fold: (1) to determine, to the degree possible, the impact that on-street parking has on transportation, development, and land-use; (2) to identify and review comprehensively "on-street" parking policies and management practices in large cities; and, (3) to recommend best practice strategies for on-street parking in large cities.

This report is the culmination of the year-long study, which included an extensive literature review, one-on-one discussions with city parking officials, a peer-to-peer exchange session in Boston, and a detailed questionnaire to which 9 U.S. cities responded (5 of which are among the 10 most populous U.S. cities, with the remainder in the top 25).[1]

1.1 The Importance of On-Street Parking

On-street parking is a key factor in promoting businesses in cities, particularly within central business districts. As a type of shared parking, on-street parking is an efficient means for allowing multiple users to utilize the same space at different times to reach multiple destinations. On-street parking provides easy access to businesses located on city streets and occupies less land per space than off-street parking which requires access lanes in addition to parking spaces. For pedestrians, on-street parking creates a barrier between moving traffic and individuals walking on the sidewalks, providing a measure of safety

[1] www.census.gov. Responding cities included: Boston, Chicago, Dallas, Los Angeles, New York City, Phoenix, Portland, San Francisco, and Washington, DC. See the Appendix A for a copy of the questionnaire.

and reducing the level of perceived noise. Further, depending upon how on-street parking is situated on a street, it can also serve as a traffic calming device, thereby reducing accidents or at least making them less severe.[2]

However, on-street parking is not without trade-offs. The same barrier between moving traffic and individuals on the sidewalks can also create visual obstructions for both pedestrians trying to cross intersections and vehicles moving along a street, thus increasing accidents. On-street parking also competes with other uses of roadways, including additional lanes for traffic flow, bike lanes, and wider sidewalks. Further, as drivers search for open spaces, congestion on roadways is increased. Finally, on-street parking, like all forms of parking, attracts vehicles, which generates more traffic. In fact, for large cities trying to increase transit ridership, availability and pricing of on-street parking become critical tools.

1.2 Background on the Cities Participating in the Study

Some background information on the nine cities that participated in the study is of use before continuing. Resident populations in the cities, based on the 2000 Census, range from a low of 529,121 (Portland) to over 8 million (New York City).[3] In terms of area, the smallest city represented is Boston (50 square miles) and the largest is Phoenix (485 square miles).[4] Downtown areas ranged from 1.5 square miles (Dallas) to 8.5 square miles (New York City). Dallas has the lowest population density of the cities represented, with 3,095 individuals per square mile, while New York City's population density is just over 8 times that of Dallas.

In terms of transit, all of the cities that participated have bus service, though to varying degrees. 7 of the 9 have commuter rail; 5 have light rail; 6 have subways; and 4 make use of other alternatives, including water shuttles or taxis (Boston, Chicago, New York City), ferries (New York City), street cars (Portland), and trolleys (Chicago). New York City also has a tramway to Roosevelt Island and will soon have the air trains as well. With respect to the percentage of daily trips into the central cities utilizing public transit as the main mode of travel, New York City reported 65%, closely followed by San Francisco at 61%. Chicago reported that one-half of the trips utilize public transit, with Boston just beneath that at 46%. Dallas and

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[2] Based upon one-on-one discussions with several of the cities that participated in this study, a decision was made not to review parking geometry (e.g., angle parking, parallel parking, perpendicular parking) here. Many of the large central cities have streets that have widths too small to consider angle or perpendicular parking. Furthermore, since whether angle parking can effectively replace parallel parking is very much case specific, there was a sense that the cities would not benefit from sharing their experiences to the degree that they benefit from discussions of other on-street parking-related areas. Should one want to review the debates around angle parking, see John D. Edwards, "Changing On-Street Parallel Parking to Angle Parking," *ITE Journal* 72,2 (February 2002): 28-33; and Paul C. Box, "Angle Parking Issues Revisited, 2001," *ITE Journal* 73, 3 (March 2002): 36-47. Also, Department for Transport, Local Governments, and Regions, *Better Places to Live By Design: A Companion Guide to PPG3*, ch. 5, section 4, http://www.planning.dtlr.gov.uk/betrplac/pdf/cha5_4.pdf.

[3] According to the 2000 Census, www.census.gov, resident populations in the nine cities are: Boston (589,141); Chicago (2,896,016); Dallas (1,188,580); Los Angeles (3,694,820); New York City (8,008,278); Phoenix (1,321,045); Portland (529,121); San Francisco (776,773); and Washington, DC (571,822).

[4] Boston (50 mi^2); Chicago (228 mi^2); Dallas (384 mi^2); Los Angeles (472 mi^2); New York City (322 mi^2); Phoenix (485 mi^2); Portland (145 mi^2); San Francisco (47 mi^2); and Washington, DC (61 mi^2).

Washington, DC both report about one-third while those commuting into the cities of Phoenix and Portland rely on transit much less (20% and 15%, respectively).[5]

1.3 Broad Issues and Concerns

On-street parking has many interrelated, though not always integrated, elements, both in the policy and operations areas. How on-street parking is related to broader issues of land use, economic development, and travel behavior is still not well understood. Further, how best to accomplish every-day management and enforcement tasks has rarely been covered in the literature. Indeed, much of the literature dealing with operations uses a case study approach, often detailing just one case. There are few surveys that identify operations or policy across several cities.[6] Thus, while cities can often point to areas of difficulty, finding solutions is not simple.

To give a sense of the breadth of issues being dealt with in terms of on-street parking, the cities in the study were asked to list their three most critical on-street parking problems. Among the answers were:

- *Lack of availability of parking spaces*. While the most common statement was something like that of New York City – "too many vehicles, not enough spaces," – others, like Dallas, noted problems with downtown spaces, and some, like Los Angeles, pointed to a lack of residential spaces, in particular.

- *Juggling multiple interests*. Residents, visitors, businesses, and other groups all have different needs and desires when it comes to on-street parking. Determining the best mix for serving these interests is critical, but not easily accomplished.

- *Abuse of permits for disabled persons (ADA parking permits)*. There are many instances of persons without disabilities making use of reserved spaces as well as misusing ADA permits. For several cities there are state mandated requirements that also lead to difficulties with legitimate ADA permits being used for long-term metered on-street parking, thus limiting turn-over. For example, Oregon state law mandates all-day free on-street parking for persons with disabilities.

- *High levels of idling with resulting emissions*. With on-street parking in high demand and insufficient spaces, many drivers wait for spaces to become available.

- *Replacing obsolete technologies*. There are many new technologies available for on-street parking, but there are also financial and political hurdles that must be overcome.

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[5] See Appendix B, p. B-1.

[6] One study that does provide comparison across cities is Gerard C.S. Mildner, James G. Strathman, and Martha J. Bianco," Travel and Parking Behavior in the United States," Discussion Paper No. DP96-7, Center for Urban Studies (December 1996), http://www.architect.org/liveablecities/parkingus.pdf. The study surveyed 20 central cities, 7 of which are included in the current study as well.

- *Misuse of commercial loading spaces*. Misuse is cited both in terms of non-commercial vehicles using the spaces and commercial vehicles utilizing the spaces inappropriately.

The following chapters touch on a number of these issues and more. Recognizing the limits of the literature, but seeking to move beyond, much of the information is derived from discussions with parking officials or from the questionnaire that was filled out by them. As such, the information detailed in the remainder of this report serves as an important foundation for further study and analysis specific to on-street parking planning and operations.

2. THE DYNAMICS OF PARKING IN URBAN AREAS: LAND USE, ECONOMIC DEVELOPMENT, AND TRAVEL BEHAVIOR[7]

Parking is a means to an end, not an end in itself. As Richard Voith writes in a 1998 *Business Review* article, parking "simply allows people access to the places where they want to shop, play, or work. The demand for parking in the CBD [central business district] thus depends on how many people want to drive to the CBD to do any one of those things."[8] While true to a degree, this statement is an over-simplification of a complex and dynamic relationship between parking and land use, economic development, and travel behavior. Indeed, in a 1997 article, "The High Cost of Free Parking," Donald Shoup suggested that "parking is the unstudied link between transportation and land use."[9]

Decisions on how to manage parking can exert tremendous influence on a number of other areas. A Cambridge, England study by Ben Still and David Simmonds, for example, identifies three direct effects that parking has on urban development: (1) changes in the provision of parking and its cost affect the overall cost of travel; (2) changes in parking can alter urban density levels (since parking requires land that could otherwise be used for residential or commercial buildings); and, (3) parking can directly generate revenue as an economic activity. Further, as a result of the impact on cost of travel, there are a number of indirect effects as well, including changes in the levels of congestion, air quality, and changes in travel behavior.[10]

The following discussion provides a framework within which to think about parking. Touching on the relationship between parking and economic development, land use, congestion and capacity, and travel behavior, it helps provide the context within which decisions related to parking are made, highlights the multiple dimensions of parking, and aids in identifying gaps in the on-street parking literature.

2.1 A Brief History of Parking Planning and Regulation

To fully appreciate the context within which decisions on parking are made, it is helpful to have an understanding of how the concepts of parking planning and regulation developed for both off-street and on-street parking. Thus, the following paragraphs trace the history of parking planning and regulation in the United States.

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[7] Given the paucity of literature related directly to on-street parking, the following section draws heavily upon the more extensive body of literature related to off-street parking.
[8] Richard Voith, "The Downtown Parking Syndrome: Does Curing the Illness Kill the Patient?" *Business Review* (January/February 1998): 4.
[9] Donald C. Shoup, "The High Cost of Free Parking," *Journal of Planning Research* 17, 1 (Fall 1997), http://docs.vircomnet.com/mobility/parking_vc/1.htm, p. 1.
[10] Ben Still and David Simmonds, "Parking Restraint Policy and Urban Vitality," Prepared by David Simmonds Consultancy, (Cambridge, England), p. 2. Also published in *Transport Reviews* 20 (2000): 291-316, http://www.ccip.fr/etudes/arch/pdf99/lem9905a.pdf. For further discussion on how changes in transportation costs affect travel behavior, land use, and development, see Terry Moore and Paul Thorsnes, *The Transportation/Land Use Connection*, Planning Advisory Service Report #449/449 (Chicago: American Planning Association, 1994).

Land Use and Off-Street Parking

Where cars and other vehicles flow, parking is needed. Indeed, the concept of the parking garage was originally developed in 1920, during a period in which cars were becoming more affordable and their use more widespread.[11] Though the initial intent was to protect personal vehicles from the negative effects of the weather, business leaders and policymakers saw a link between off-street parking and economic development, believing that ensuring access for customers and employees would help business grow. Further, in a time when congestion was already a problem in crowded downtown areas, off-street parking was seen as a solution to getting the cars off the streets when not in use.

Columbus, OH was the first municipality to establish off-street parking requirements in its zoning codes (1923), followed by Fresno, CA (1939). While others were slower to implement similar zoning codes (New York City did not have off-street parking requirements until 1950, for example), by the late 1940s and early 1950s, requirements for adequate off-street parking had become a regular feature of municipal planning and zoning in a number of cities.

In terms of on-street parking, there is very little written regarding the history of regulation. However, as off-street parking became more common, on-street parking did go through some changes. Prior to the first off-street parking facilities, on-street parking had, of course, been present for some time, but nowhere was it regulated. With the advent of off-street parking, many larger cities like Chicago, Detroit, and Philadelphia began eliminating on-street parking to improve traffic flow.[12] Others, however, took a different approach: in 1935, Oklahoma City was the first city to regulate on-street parking using meters.

Following World War II, the key focus of transportation policy in most parts of the country was building more roads to accommodate the rapid growth in the number of cars and the corresponding rise in congestion. In 1956, Congress responded by passing the Interstate Highway Act, which provided long-term federal support for road and highway construction, and had tremendous implications for land use and development. Highways decreased the cost of transportation within and between cities, and allowed people to move away from their places of employment. Retail businesses followed the workers, moving out from the urban centers. Land use policies during the period encouraged this pattern, developing regulations that required easy access by cars as well as sufficient (and often, more than sufficient) parking.[13]

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[11] For a descriptive history of the evolution of the garage concept and design, see James E. Starf, "Introduction," In *The Dimensions of Parking*, 4th edition (Washington, DC: Urban Land Institute, 2000), pp. 1-5.
[12] Washington State Department of Transportation (WashDOT), Commute Trip Reduction, "Local Government Parking Policy and Commute Trip Reduction, 1999 Review," p. 4.
http://www.wsdot.wa.gov/tdm/tripreduction/download/1999_parking_policy_review.pdf.
[13] Moore and Thorsnes, *The Transportation/Land Use Connection*, chapter 1.

Taking their cue from the same set of circumstances, organizations like the American Automobile Association and the American Planning Association began recommending minimum off-street parking ratios for various forms of land use, including industrial areas, shopping centers, and residential developments. At a time of prosperity, relatively low land costs, and little understanding of the negative effects of motor vehicles, off-street parking requirements were often set at levels which would accommodate peak demand. As more than one study has noted, this often meant planning for demand during the weeks immediately prior to Christmas. During the rest of the year, in many cases, a large number of parking spaces remained vacant.

Responding to the continuing and projected growth in the number of cars, more and more municipalities began to plan for off-street parking. In many cases, they either adopted the recommended off-street parking requirements, which were assumed to be accurate and rational, or used the same ratios utilized by neighboring communities. However, parking demand varies from one location to another, and there are many factors important in determining exactly how much off-street parking is needed (e.g., type and intensity of land use, location, accessibility, availability of alternate modes of transportation) so minimum parking requirements are not easily transferable from lone locale to another.[14] Thus, either method often led municipalities to embrace requirements that were inappropriate for their own circumstances. The result was excessive amounts of parking, with many spaces left unused, and increased rather than decreased levels of traffic congestion.[15]

2.2 It's All in the Pricing…Though for On-Street Parking, Availability is Also Key

The fallacy of solely relying on handbooks or surveys of neighboring cities for parking requirements was first described by Donald Shoup and Don Pickrell in their 1978 article, "Problems with Parking Requirements in Zoning Ordinances."[16] A 1983 study by Thomas Smith, *Flexible Parking Requirements*, outlined how municipalities could build flexibility into their zoning to avoid some of the above pitfalls.[17] However, a 1996 survey of 144 cities, showed that the two most frequently cited means for setting off-street parking requirements continued to be surveying nearby cities and relying on handbooks of parking generation data produced by the Institute of Transportation Engineers-ITE.[18] For urban areas, the

[14] See Mary S. Smith, "Zoning Requirements," in *The Dimensions of Parking*, pp. 25-31, for a discussion on the inability to transfer local off-street parking regulations from one locale to another. For a discussion of the factors involved in determining the appropriate ratio for off-street parking, see Thomas P. Smith, *Flexible Parking Requirements*, Planning Advisory Service Report #377 (Chicago: APA, 1983), especially chapters 1-3. Also see Todd Litman, "Pavement Busters Guide: Why and How to Reduce the Amount of Land Paved for Roads and Parking Facilities," Victoria Transport Policy Institute (January 2000), http://www.vtpi.org/pav-bust.pdf, and Gerald Salzman and Jean M. Keneipp, "Parking Demand," in *The Dimensions of Parking*, pp. 11-15.
[15] See Smith, *Flexible Parking Requirements*, especially chapter 1; also, WashDOT, "Local Government Parking Policy and Commute Trip Reduction," p. 5.
[16] Donald C. Shoup and Don H. Pickrell, "Problems with Parking Requirements in Zoning Ordinances," *Traffic Quarterly* (October 1978): 545-563.
[17] Smith, *Flexible Parking Requirements*.
[18] Donald C. Shoup, "The Trouble with Minimum Parking Requirements," Victoria Transport Policy Institute (1999), p. 1, http://www.vtpi.org/shoup.pdf; Shoup, "The High Cost of Free Parking."

drawbacks of relying on the latter method are compounded by the fact that the ITE handbooks utilize data from suburban areas with little transit and are thus, not applicable to large cities.[19]

In the 1978 article and in more recent studies, Shoup and others have made a powerful argument for bringing basic economic precepts of supply and demand to parking. The costs of parking are high – they include the costs for purchasing properties, building, and maintaining facilities. There are also numerous opportunity costs associated with parking since the space utilized could be used for other purposes, such as additional lanes for traffic flow and sidewalks (in the case of on-street parking) or for building other types of facilities or providing open spaces (in the case of off-street parking). Yet, parking is often provided to the users free or at low prices. As a result, market distortions occur, with those who use parking spaces paying less than they are worth, while others share in the cost (in terms of higher taxes, rents, or retail goods, as well as environmental degradation) even when they do not use the spaces.[20]

Instead of continuing to focusing on building more off-street parking, Shoup argues that "pricing curb parking rather than requiring off-street parking will improve urban design, reduce traffic congestion, [and] restrain urban sprawl…"[21] More specifically, Shoup stresses the need to price on-street parking in response to demand (i.e. value or congestion pricing[22]).

Parking and Economic Development

According to Still and Simmonds, there is a clear and generally positive association between parking and retail growth. In fact, off-street parking requirements were seen as a means to promote economic growth in central business districts as early as the 1930s.[23] In *The Dimensions of Parking*, for example, Smith explains that the adequacy of parking can influence economic return on public and private sector investments, and affect property values.[24] In an earlier study, one-third of respondents to a survey of central business district retailers, conducted by the Federal Reserve Bank of Philadelphia and the Philadelphia Center City District, noted that improving parking would be the most important change to improve their business.[25] While much of the research on the relationship between parking and economic development focuses on off-street parking, this sentiment was echoed at the June 12, 2002 peer-to-peer exchange session on on-street parking. One parking official noted that parking, and in particular, on-street parking, "…is one of the best ways to help promote businesses in the central business district."[26]

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[19] Shoup, "The Trouble with Minimum Parking Requirements" and "The High Cost of Free Parking." Also see Litman, "Pavement Busters Guide."
[20] See Shoup, "The High Cost of Free Parking," and Litman, "Pavement Busters Guide," p. 7.
[21] Shoup, "The Trouble with Minimum Parking Requirements," p. 23.
[22] Both types of variable pricing, these terms are often interchanged, but have slightly different meanings. Value pricing means charging for something of additional worth; congestion pricing means charging to reduce the number of vehicles. While some variable pricing programs have aspects of both congestion and value pricing, they are distinct. For more, see C. Kenneth Orski, "Charging for the Use of Roads," *Transportation Quarterly* 56, 3 (Summer 2002): 33-35.
[23] WashDOT, "Local Government Parking Policy and Commute Trip Reduction," p. 4.
[24] Mary S. Smith, "Parking Studies," In *The Dimensions of Parking*, p. 7.
[25] Voith, "The Downtown Parking Syndrome.
[26] Peer-to-peer exchange session on on-street parking, facilitated by the Rudin Center, and held in Boston, MA, 12 June 2002.

Thus, there is a broadly shared belief that parking is good for central business districts, but there is also a tendency among business owners to press for free parking, believing that it is more attractive for consumers. Several cities, including Boston, are trying to educate business owners about the importance of charging for on-street parking in order to generate turnover and, thus, more potential customers. However, as Hartmutt Topp cautions in his 1995 article, "The Role of Parking in Traffic Calming," there needs to be a careful balance since increased turnover can also increase traffic.[27]

Parking and Travel Behavior

Increasing transit ridership is a key objective of many policymakers and planners, especially since the 1990 Clean Air Act Amendments and the 1991 Intermodal Surface Transportation Efficiency Act (ISTEA). Yet, in 1999, 87.7% of the U.S. population used a car as the primary means for transportation to work, and of these, only 10.7% carpooled.[28] Several models have been developed that demonstrate the impact parking can have on transit ridership. As with land use and economic development, Martha Bianco, et al., point out, "a key connection between parking and transit ridership lies in the supply and price of parking."[29] Indeed, the Bianco study was based in part on a 1996 report she co-authored that found:

> Cities with both a relatively high degree of public intervention in parking policy and high transit service levels – particularly in terms of frequency – are more likely to have high transit ridership levels than cities with less public involvement in parking policy and a lower degree of transit service.[30]

The report examines eight parking strategies and finds that there is no single strategy that works best. Many strategies can have unintended negative consequences. A 1999 study of midtown Atlanta by Erik Ferguson notes, for example, that "spillover parking is a much more likely commuter response to parking pricing than is alternative mode use…."[31] This is especially true in areas heavily dependent upon automobiles for the primary mode of transport. With respect to the cities that participated in the current study, this would suggest that consumers in cities like Phoenix and Portland would be the least likely to shift their mode of travel in response to parking pricing.

2.3 Summary

Transportation affects land use by providing access, which allows the possibility of developing higher density development. According to Terry Moore and Paul Thorsnes, "no single force has had a greater

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[27] Hartmutt H. Topp, "The Role of Parking in Traffic Calming," *World Transport Policy & Practice* 1, 3 (1995): 17-18.
[28] U.S. Bureau of Transportation Statistics, "Principal Means of Transportation to Work," www.bts.gov/btsprod/nts.ch1-web/1-32.htm.
[29] Martha J. Bianco, Kenneth J. Dueker, and James G. Strathman, "Parking Strategies to Attract Auto Users to Transit," Presented at the Transportation Research Board, 77th Annual Meeting, Washington, DC (January 11-15, 1998), p. 1.
[30] Mildner, et al., "Travel and Parking Behavior in the United States," p. 11.
[31] Erik Ferguson, "Office Development, Parking Management, and Travel Behavior: The Case of Midtown Atlanta," *Journal of Transportation and Statistics* (May 1999): 1.

impact on the pattern of land development in American cities in [the 20th] century than highways."[32] As highways were built to respond to increased number of automobiles, they in turn encouraged automobile use, and planners were quick to accommodate these cars in a number of ways, including parking.

Shoup and others have pointed out, however, that many of the premises on which parking is based are not valid, or at least need more careful analysis. Further, though studies exist on off-street parking, literature about on-street parking is scarce. Nevertheless, what does exist points to a real link between on-street parking, land use, economic development, and travel behavior. A better understanding of the nature of these links is critical for effectively planning and managing on-street parking.

[32] Moore and Thorsnes, *The Transportation/Land Use Connection*, p. 2.

3. ON-STREET PARKING POLICY, PLANNING, MANAGING, AND OPERATIONS IN SELECT CITIES

Section 2 dealt with broad issues concerning the relationship between parking and broader goals of economic development, land use, and travel behavior. However, on an every day basis, on-street parking planners and managers need to deal with policy and planning, management and operations. While the problems are similar from city to city, the approaches taken to address them are varied.

To aid in broadening the understanding of how on-street parking is dealt with in different urban areas, and to foster a discussion among and between cities, this section details the various difficulties involved with and approaches taken by the nine cities that participated in the study when dealing with particular facets of on-street parking. Where appropriate, and where literature was available, approaches from other cities are also discussed. Given the limited state of research on on-street parking, much of the information described serves as a foundation for future analyses; nevertheless, where possible, correlations are shown and conclusions drawn.

3.1 Managing On-Street Parking

It has been said that the key to on-street parking is effective planning and management. However, to plan and manage effectively, one must know not only who needs the space and when, but what spaces are available and where. On the first set of tasks, most cities perform well; however, if the results from the questionnaire are indicative, many are unable to effectively track their assets. When asked, for example to provide the number of on-street parking spaces available for the entire city and for the downtown area, only 2 cities out of 9 (Chicago and Dallas) could provide figures for both, and 2 cities (Los Angles and Phoenix) could not provide information for either. Similarly, when asked how many on-street parking spaces were lost either in the city as a whole or in the downtown area as a result of September 11 and ensuring security measures, only 4 of the 9 cities could provide figures.[33] In contrast, for off-street parking spaces, every city but one (Phoenix) provided figures. Similarly, when asked to provide the number of parking-related signs throughout their cities, only 6 of the 9 cities could provide an estimate, and of these only 2 (Boston and New York City) could provide an estimated number of how many signs are on the streets in the downtown areas.[34]

In a related set of questions, cities were asked what kinds of information related to on-street parking are readily available and in what forms. While 6 of the 9 cities reported having information related to the location and description of regulations on their streets, only 4 could provide information on the location and description of their asset inventory, and one of these could only provide this information for meters. The degree of confidence in the information ranged broadly, but more significant perhaps, is that the

[33] Appendix B, p. B-18.
[34] Ibid., p. B-3 and B-4.

majority of the cities rely primarily on paper files; only 2 (Chicago and New York City) make use of some form of database management system, and 1 (Boston) utilizes a virtual video system – GeoVista – to catalogue information.[35]

For large cities where multiple agencies and divisions are responsible for various aspects of on-street parking, having basic information on assets and regulations in an accessible format that can be updated and easily shared across departments and agencies is vital. Determining how best to do this is a topic in need of further discussion and assessment.

Integration and Coordination Issues

The reason data could not be provided was not always because it was unavailable; in some cases, it was just difficult to find or resided in an agency different than that which was filling out the questionnaire. In fact, in all of the cities multiple agencies and/or divisions with Departments of Transportation or Public Works are involved with parking. Just looking at 4 key areas related to on-street parking – issuance, enforcement, maintenance, and purchasing – for example, no city had fewer than 3 agencies and/or divisions sharing some portion of the responsibility. Add in the parties who deal with macro- and micro-policy decisions and planning, and the number of divisions sharing responsibility rises further. This separation of responsibility is both inevitable and, in many cases, purposeful – inevitable, because there are specialized job requirements for the various tasks related to on-street parking; purposeful because in certain cases firewalls are required for sound audit principles (e.g. having separate authority for issuance and adjudication).[36] Thus, the risk of a silo effect were each group remains isolated in its policies and information is inherent Yet, integrating or at least coordinating policy, management, enforcement, and even adjudication is critical since each relates to the others.

To address this, several cities have meetings with various agency members to deal with on-street parking. While some are conducted on an ad hoc basis (for example, Portland holds sessions with the Association for Portland Progress Transportation Committee and with various community associations), others are held on a formal and regular basis. New York City has a monthly session with multiple Department of Transportation units and the New York Police Department. Of the nine cities involved in the study, Chicago's *Mayor's Traffic Management Task Force*, provides the highest level of consistent and formalized interaction among various agencies and divisions dealing with on-street parking operations. Meetings are held weekly to review concerns related to daily traffic operations. Ongoing attendees include the Department of Transportation, traffic police, Streets and Sand (they put up/take down barricades, cones, and message boards), Sewer and Water, the museums, campuses, and trolley

[35] Appendix B, p. B-16 and B-17.
[36] Personal Communication, Thomas Kadzis, 11 December 2002.

operators. Any agency, organization, company, or other group related to major project that may affect traffic patterns is also invited to the sessions when appropriate.

3.2 Curb Loading

Each of the cities was asked to respond to a number of questions related to different types of curb loading, including cabs, commercial vehicles, tour buses, and valets. While there are some variations in the hours of operation, length of time a space can be used, and how spaces are marked, the variations are not considered to be significantly different from one city to another. For example, various types of curb loading zones are marked by signs in all of the 9 cities, though 5 (Dallas, Los Angeles, Phoenix, Portland, and San Francisco), also use some form of street or curb marking.[37]

Dealing with cabs and with commercial vehicles present the most difficulties across the board, with 6 of the 9 cities reporting difficulties dealing with cabs and 7 of the 9 reporting problems with commercial loading spaces. In the former, double parking and overflow beyond marked zones is the most common complaint; in the latter, the two most common problems are use of the spaces by noncommercial vehicles and overtime abuse. Problems with tour buses were cited by 5 of the 9 cities, and ranged from excessive idling and difficulties in finding locations to underutilization of designated spaces.[38]

The cities generally rely on fines (which can range anywhere from $20 - $100 for violations related to cabs or commercial vehicle loading zones) to deal with the misuse of spaces, overflow, and double parking. Noting that half the vehicles found double parked are commercial vehicles, Chicago goes a step further in dealing with double parking. The ticket issued for this violation is associated with “obstruction of traffic” and counts as a moving violation. When deemed appropriate, vehicles may also be towed in Chicago for double parking.[39]

New York City has implemented a program for commercial parking in midtown that has, among other goals, reduced the number of violations related to overtime abuse by commercial vehicles in loading zones. In fact, surveys prior to the program showed average parking time for loading/unloading at 4-6 hours; average parking time now is reported to be about 90 minutes. (See Section 4.3 – Best Practices for a detailed description.)

3.3 Preferential Parking

There are numerous provisions for preferential parking in cities and multiple problems associated with them. Among the most difficult areas to deal with, both in terms of policy and operations are government and ADA permits.

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[37] Appendix B, pp. B-10, B11, B-12.
[38] Ibid., pp. B-10 and B-11, and personal communications.
[39] Based on the discussion during the peer-to-peer exchange session, Boston, MA, June 12, 2002.

ADA Parking Permits

Providing on-street parking for persons with disabilities represents a challenge for most cities, and how they deal with ADA parking on-street varies significantly. Only 1 of the 9 cities reported that it requires individuals with ADA permits to pay meters (Phoenix) for on-street parking (though several others require it for use of off-street spaces). Washington, DC has a relatively complex set of regulations that allows persons with disabilities to remain for double the allotted time for free, but then requires that they pay the regular meter rate if they stay parked beyond that period.[40]

The agency responsible for issuing ADA permits also varies from city to city. In New York City, the City Department of Transportation is responsible; in Boston, Los Angeles, Washington, DC, permits are issued by the Department of Motor Vehicles; and in Chicago, the state issues the permits. New York City is the only city that does not recognize ADA permits issued by other locales. Fines for violations related to ADA parking range from a low of $40 (Phoenix) all the way to $450 (Portland, which has a graduated set of fines based on the number of offenses). Taken as a percentage of median household income in each city, Phoenix still has one of the lower rates at only 0.10%, with Los Angeles and Portland on the higher end (0.93% and 0.49-1.16%, respectively).[41]

While a number of problems associated with ADA parking are noted (dubious spots, loose regulations at the state level, misuse of ADA parking for long-term parking, loss of revenues), by far the greatest difficulty cited is abuse of permits. Countering the use of ADA permits by individuals without disabilities is extremely difficult since not all disabilities are readily apparent, and a person who appears fine may have a legitimate disability. Further, in Boston and to some degree Chicago, there is an additional problem that results from the way spaces are allocated. In both cities, there are ADA reserved spaces for on-street parking; in the case of Boston, many of these spaces are requested in front of private homes. However, there is no systematic review of the spaces so over time, even if the space is no longer required, it often remains to be used by individuals without disabilities.

No city that participated in this study has found a way to deal with such abuses, but several possibilities were discussed. As technology is further integrated into parking operations, a system might be established that would allow parking enforcement personnel to download information to their PDAs (personal digital assistant, e.g. Palm Pilot, Blackberry) identifying legitimate ADA permits. (This would necessitate linking more than one driver's license or license plate to a permit so that a person could change cars without being ticketed. New York City can currently place multiple license plates on a

[40] Based on the discussion during the peer-to-peer exchange session, Boston, MA, June 12, 2002.
[41] Appendix B, p. B-9.

permit.) In most cases, ADA permits are free. A suggestion was made to implement a sliding scale fee system that would not only generate some revenues, but might also reduce abuse by adding a cost.

Government Parking Permits

All cities issue permits for city, state, and federal government officials, for multiple city agencies, as well as for foreign diplomats, and all cities cite abuses of these permits to varying degrees. As a way to avoid or counter some of the abuse related to city, state, and federal government as well as city agency permits, cities like Boston and Washington, DC do not allow permits to be used in private vehicles. Los Angeles makes an allowance if a vehicle is being clocked for mileage by the city. New York City has similar rules, but as with many cities, enforcement is the weak point.

To gain more control over these types of permits, Los Angeles recently took back their placards and reissued them. Similarly, in May 2002, New York City began reducing the numbers of authorized permits for the New York Police Department and the City's Department of Transportation. By the end of 2002, the number of authorized permits is expected to be 14,501, down from 19,722 at the end of 2001.[42] Whether these two measures help reduce abuse of the permits remains to be seen.

Residential Parking Permits

A 1996 study of 20 central cities noted that spillover parking into residential areas often resulted from raising prices of parking in the central business districts.[43] Issuing residential parking permits is a common method for limiting or preventing non-residents from parking their cars on neighborhood streets. Several quality of life benefits have been associated with residential parking permits, including: (1) improving the ability of residents to find parking on their street if needed; (2) enhancing a sense of community and neighborhood identity in the midst of an urban area; (3) mitigating the perception that neighborhood streets are being used as parking lots; and, (4) helping achieve a balance between local and non-local residents.[44] Seven of the 9 cities issue permits for residential parking (New York City and Portland do not). They are commonly issued in areas near clubs, restaurants, stadiums, and other facilities that attract many non-residents who have parking needs. With respect to how decisions are made to determine whether a neighborhood is eligible for such preferential provisions, most of the cities report that the process is neighborhood driven, that is the first step is a petition or other type of application. Fees for residential permits either do not exist (Boston) or are very low ($10-$35/year); fines for violations related to residential permits are also relatively low, ranging from $16 to $50.[45]

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[42] "New York City Cuts Parking Pass Perks for City Officials," *Parking Today* 7, 5 (May 2002): 18.
[43] Mildner, et al., Travel and Parking Behavior in the United States."
[44] Halifax Regional Municipality, Engineering and Transportation Services, "On Street Parking Policy for Residential Streets," Draft Document (February 2001), www.region.halifax.ns.ca/traffic/Reports/ONSTREET.pdf.
[45] See Appendix B, p. B-9.

3.4 Metered Parking

The value of pricing on-street parking was described in Section 2; how cities price their metered parking, maintain their systems, collect fees, and enforce parking is discussed in the following paragraphs. By way of background, there are a few interesting figures that bear mentioning. The standard length of an on-street meter space is, not surprisingly, similar from city to city, with 6 of the 9 cities set at 20 feet. Dallas is a touch higher with 21 feet. Phoenix's standard is 22 feet for interior spaces, with the first and last stalls in rows of multiple meters set at 17 feet. New York City's standard length for a metered space also ranges from 19-22 feet.[46] Standard time limits for on-street parking are usually 1 or 2 hours, but other time limits range anywhere from 15 minutes to 48 hours.[47] With respect to days and hours of operation, most cities' meters operate either Monday-Friday or Monday-Saturday. Portland, however, also has hours of operation on Sunday (1pm – 10pm). The cities reported hours of operation usually beginning between 6am and 9am and ending anywhere from 5pm to 11pm. Many of the cities have multiple hours of operation or days of operation depending upon location.[48]

Meter Technologies

With respect to types of meters, all the cities make use of more than one type since not all types of meters are efficient for all types of uses. The vast majority of meters are still either mechanical or electronic, with several cities moving toward "pay/display" or "free flow parking" meters, which are already common in European cities. These latter types are particularly helpful in large density areas where one can add up to 15% more parking using a multi-space system. Those cities that have begun using these meters (Chicago, Los Angeles, and New York City) note that the public likes these meters because if they receive an erroneous summons, they can just send in the voucher without coming to court. The cities like the systems because if one box is broken, a driver can find another and revenues can still be collected. (Portland is slated to install 150 of these meters in summer 2002. It expects to replace 80% of its single space meters over the next 2-3 years.) These meters also have additional versatility. Since they have keypads, license plates can be entered, allowing further streamlining of ticketing. While New York City and Chicago are not currently making use of this particular application, they are moving in that direction.[49]

Many of the cities are also looking toward smart card technologies for on-street parking; in fact, 8 of the 9 cities reported that they have either already deployed the technologies or are in the planning stages. (Los Angeles is not looking toward smart card for on-street parking, though their regional transit authority is looking to integrate regional subway, bus, and commuter rail systems with parking on their lots.) Chicago is looking for a city-wide card that could be used not only for parking, but on buses and trains as well.[50]

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[46] Appendix B, p. B-2.
[47] Ibid., p. B-8.
[48] Ibid., p. B-4.
[49] Ibid. Also based on the discussion during the peer-to-peer exchange session, Boston, MA, June 12, 2002
[50] Ibid., p. B-20.

Other technologies do exist. Participants mentioned systems that make use of sonar or laser to determine when a vehicle has left a space so the meter can be automatically reset to 0. There are also similar systems that determine whether a vehicle has remained past the time limit so the meter cannot be refilled. Vancouver and Seattle have been testing a system that utilizes mobile phones to pay for parking. Drivers who register for the system call an automated toll-free number to begin service. The driver enters a unique number that designates his/her area location so the correct rate is charged, and enforcement personnel are equipped with PDAs that provide them with instant access to information to determine whether cars are parked validly. When finished parking, the driver again calls to "unpark" by phone. Customers like the ease of this method – the calls take about 10 seconds each; one does not need to know ahead of time how much time will be needed; and they avoid parking violations. Further, the system ensures that each person pays exactly for the time they spent in the space. Currently, the system is being utilized for off-street parking, but it has on-street applications.[51] In fact, cities in Holland and Sweden are already using this technology at the curb.

Another technology common in European cities, and being used in Aspen, CO and Arlington, VA in the United States is the personal in-vehicle meter. Similar in size to a pocket calculator, these meters are used in conjunction with a smart card. Like the mobile phone parking described above, numbers are allotted to specific parking zones. When a driver parks along a curb where there is a price for parking, he/she punches in the number of the designated parking zone, inserts the smart card and turns on the meter, then hangs the meter inside the windshield. The timer debits the pre-paid account until the driver switches off the meter.[52] The advantages are similar to those described for the mobile phone technologies. In both cases, it is also worth pointing out that these technologies are mobile – the same system can be used in multiple cities – and they are lower in cost than are conventional meters. With the in-vehicle meters, there is an additional benefit for the city since revenues are collected in advance and interest can be earned on the unused balances.[53]

Collection, Enforcement, and Maintenance

On-street parking generates significant revenues for cities, both through regular fare collection and fines. The nine cities participating reported annual revenues from on-street parking anywhere from $2.9M (Dallas) to $75M (New York City) each year.[54] Of the 7 cities that reported annual revenues from fines, Portland and Dallas were on the lower end of the scale at $2.5-$3M and $5.4M, respectively, while Los Angeles and Chicago were at the higher end of the spectrum, reporting $92.7M and $112M,

[51] Neal Podmore, "Pay to Park With Your Mobile Phone," *Parking Today* 7, 5 (May 2002): 26-27. The company that developed this technology is Verrus, Vancouver, BC, Canada. See http://canes.verrus.com/default.asp?ctState=prMain for more information.
[52] Shoup, "Buying Time at the Curb," In *The Half-Life of Policy Rationales: How New Technology Affects Old Policy Issues*, eds. Fred E. Foldvary and Daniel B. Klein (NY: NYU Press, *forthcoming*), pp. 10-11. A draft of the article was used for this report.
[53] Ibid.
[54] Appendix B, p. B-4.

respectively.[55] Revenues from fines are placed in general funds in half of the cities surveyed, but in Portland they are directed toward the Office of Transportation, in San Francisco, they are used for the municipal railway, and in Washington, DC, a portion is used to subsidize transit.

Enforcement of meters is as likely to be carried out by departments of transportation or public works as by police departments. Error rates were most often reported as between 0-2%, though Boston reported 2.1-4% and New York City reported 4.1-6%.[56] When asked about collection rates for tickets, defined as the percentage of tickets paid within 2 years of issuance, most cities reported either 60% or 70%, though San Francisco was a touch higher, reporting 75-80%. Boston was significantly higher, reporting a collection rate of 90%.[57] Among other things, this is attributed to a combination of good management, sound auditing and control principles, favorable laws, and overall efficiency in enforcement, collection, and adjudication.[58]

Maintenance of meters is carried out by the cities in 8 of the 9 cases; Washington, DC contracts it out. While most cities reported routine maintenance on a weekly basis, Dallas does routine maintenance on a quarterly basis, and Portland annually. San Francisco reported that routine maintenance occurs every fourth day. There was no correlation between the frequency of routine maintenance and the reports of the percentage of meters working at a given time. In terms of the latter, figures ranged from a low of 75% (Boston) to a high of 97% (Dallas).[59]

Cities report a number of difficulties associated with meters. The most frequently citied problems were power supply problems (4), coins jamming or not registering (4), problems with software functionality or lack of continued support (3), and vandalism (3). Other issues cited included theft, problems with reliability, and lack of spare parts. All of the cities have some form of system in place to alert the proper authorities when there is a problem with a meter. Beyond regular inspections, 7 of the 9 cities employ consumer call-in lines, and Boston monitors parking ticket appeals.

When asked *specifically* whether vandalism and theft had ever been a problem (as opposed to the open ended question from which the data above is drawn), all but Dallas reported problems with vandalism and 6 of the 9 cities reported problems with theft. In fact, when asked about the degree of the problem, several cities, including Boston, Los Angeles, and New York City, reported very high rates of meters compromised by vandalism. Information related to theft was less available, but when asked to identify the

[55] Appendix B, p. B-14.
[56] Ibid., p. B-13. Errors occur for a number of reasons, including entering incorrect information about location, vehicle, date or time on the ticket or writing illegibly, for example.
[57] Appendix B, p. B-14.
[58] Personal Communication, Thomas Kadzis, 6 August 2002.
[59] Ibid., p. B-5.

primary culprits, 5 cities noted the public, 4 cities noted that city staff have been involved, and 3 cities noted contracted staff.[60]

Congestion/Value Pricing

The cost per minute associated with meter parking is nominal in most cities, often costing less than $0.01/minute. Six of the nine central cities responding to the questionnaire make use of some form of value/congestion pricing. For the most part, this takes the form of making parking cheaper in spaces further away from the high demand areas. However, Los Angeles also has an area (Venice Beach) where the rates on the meters change depending upon the time of day. New York City has a congestion pricing program for commercial parking that involves a graduated fee depending upon how long the vehicle remains parked (See Section 3.2 for a brief description and Section 4.3 for a more detailed description).

3.5 Signage and Communicating with the Public

When it comes to communicating with the public about on-street parking, signs are, of course, the first line of communication. However, the cities represented in the peer-to-peer session all expressed dissatisfaction with signage, saying that consumers often find signs confusing (especially where there are multiple regulations) or fail to see them. Indeed, the number of different sign codes (i.e. types of signs) just for parking, in many cases was quite high: Boston reported approximately 300 separate codes; Chicago 270; New York City 200; Portland 450, San Francisco more than 100, and Washington, DC reported over 600 separate codes.[61] In terms of making the signs easy to see, average lettering ranged from 1 inch to close to 2.75 inches, with the minimum size lettering reported as small as .25 inches (Boston) and as high as 1.5 inches (Chicago and Phoenix). While it is clear that larger letters are easier to see, whether the size of the lettering correlates to the number of violations is unknown.

The total number of signs in the cities ranged from about 80,000 (Portland) to 600,000 (New York City). Since many of the cities could not provide information about exact sign locations, it is difficult to determine exactly how many signs are present per square mile. However, just to provide a sense of the differences in concentration, the average number of signs per square mile, ranged from as low as 230 (Dallas) to as high as 4,000 (Boston).[62] Again, whether the concentration of signs has any impact on violations is unknown.

All of the cities make use of color coding for their signs, and in Autumn 2001, Boston began a program that color codes meter caps to help consumers identify areas with multiple regulations. Yellow caps are used to designate loading zones and red caps denote rush hour zones where spaces may not be used for parking at specific times during the day. Currently, the loading spaces are free when used for loading

[60] Appendix B, p. B-6.
[61] Ibid., p. B-4.
[62] Appendix B, p. B-4.

during designated periods, but Boston is reviewing plans for charging. Another feature of the new meters is that they carry stickers that note if a meter is not functioning the space has a 1-hour time limit. This aids in maintaining turn-over rates.

Five of the 9 cities make use of both pictures and words on the signs to make the message clear. In terms of providing positive or negative messages, 6 of the 9 cities use signs that generally denote what cannot be done (e.g. No Parking, 7-9am), while Portland relies on signs that denote what can be done (e.g. Parking before 7am and after 9am). Washington, DC makes use of both methods. During the peer-to-peer exchange session, several participants noted that perhaps using only pictures and symbols as is done in Europe might work better. However, a cautionary note was made since there is little data from Europe that demonstrates for certain that the signs are more effective with pictures and symbols than they would be with words.

Formal public outreach is also important, and all of the cities are involved in outreach to the public at various levels, often passing out flyers prior to major changes and attending or holding sessions with community groups. Involving the public is critical; there are many cases of cities having to roll back plans as a result of public complaints. In late spring 2002, Denver, for example, has held off on a plan to enforce all meters in the city until 11pm. Currently, most meters in the city run from 8am to either 6pm or 10pm and cost between $0.20/hour to $1/hour. Responding to complaints about the different rates and hours of operation, the city announced its plan in January 2002. However, it was met with resistance by a number of business and community groups.[63] Similarly, Houston recently halted a project, pending review with business owners, to install new meters in an area of the city that previously had none.[64] Thus, it would seem that involving the public prior to making major changes in on-street parking is critical. On the other hand, several parking officials noted that even when sessions are held, once they move to implement changes, there is sometimes controversy since not everyone attends public meetings. Finding more successful ways to conduct public outreach is an area for further exploration.

All of the cities have websites that provide various levels of description related to parking regulations, permits, and fines. A quick review shows that some are more user-friendly and/or navigable than others.[65] Boston goes a step further with an educational program it has in place that involves merchants in conducting turn-over studies. Doing this helps business owners learn about the importance of using meters and facilitating turn-over.

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[63] "Denver's Unloved Parking Meter Plan Expires," *Parking Today* 7, 5 (May 2002): 30.
[64] "Parking Meters Cause Flap in Houston," *Parking Today* 7, 5 (May 2002): 41.
[65] For examples of some of the more navigable sites that have a good deal of information, see http://nyc.gov/html/dof/html/parknyc.html for New York City; http://www.lacity-parking.org/ for Los Angeles, http://www.ci.chi.il.us/Revenue/Parking/Parking.html for Chicago; and http://www.cityofboston.gov/transportation/parking.asp for Boston.

3.6 Summary

This section touched on several facets of on-street parking policy, planning, management, and operations. Describing how the various cities approach the various components helps demonstrate the diversity that exists, and highlights the various challenges that are faced by those trying to effectively manage on-street parking. While it is easy to pinpoint the problem areas, determining how to best solve them is much more difficult, and many areas would benefit from further study and discourse.

4. FINDINGS AND RECOMMENDATIONS

The literature review along with the June 12, 2002 peer-to-peer exchange session in Boston identified several areas in need of further study as well as a number of best practice and "potential" best practice strategies being employed in various cities. The word "potential" is utilized for several strategies that have been recently implemented and for which the data have not been formally published. Nevertheless, they are worth monitoring.

4.1 Lessons Learned

There were several lessons learned as a result of this study, but chief among them are the following:

- ***To effectively manage, one must know what it is he/she is managing.*** In terms of on-street parking, this translates into the need for having basic information on assets and regulations in an accessible format that can be updated and easily shared across departments and agencies. Most of the cities currently lack this capacity.

- ***Integrating and coordinating among agencies and divisions is critical.*** Multiple agencies and divisions within those agencies are responsible for various aspects of on-street parking. While they are all connected, they are not always effectively integrated. Thus, even if one aspect of on-street parking is managed well, if there is a lack of coordination, the overall result may be inefficiency.

- ***Further research is necessary.*** One can find out what techniques or approaches are used by different cities for various elements of on-street parking, but often cannot easily find analyses of whether the various measures are effective. As was described in Section 2, many of the assumptions that parking is based upon, be it off-street or on-street are at best more complex than they appear, and at worse are false. There is reason to believe that on-street parking does have an effect on, and is affected by, larger goals of land use, economic development, and travel behavior. However, the extent of the impact and what this means in terms of effective planning needs to be studied much more extensively. In particular, time trends would be helpful since much of the literature relies on a "snap shot" approach.

- ***Ongoing peer-to-peer exchange on on-street parking is important.*** Because the literature about on-street parking is sparse and because there is little communication among parking officials from city to city, providing a continuous and regular means for exchanging information is particularly important. Many cities begin and end pilot projects and never share the information outside their borders so others cannot learn what works and what does not.

4.2 Areas in Need of Further Study

When asked what types of policies, technologies, or practices would help make on-street parking more efficient or easier to manage, the officials represented at the peer-to-peer exchange session provided a number of suggestions. In each case, there was agreement that these may be valuable approaches, but that more needs to be done to assess either their potential or the means for implementation.

- ***Ban on cars in the Central Business District between 9am and 5pm***. Recognizing the political hurdles involved, several cities still expressed interest in banning cars in the central business districts during weekdays. Further assessment of the risks and benefits of this approach is needed.

- ***Better collaboration with suburban areas***. Cities expressed a desire for suburban residents and businesses to better understand the costs of subsidizing auto use. They also mentioned the possibility that implementing similar fee structures for parking in the cities and in outlying areas might be beneficial. While there is an understanding that suburban areas rely more on cars because transit is not as available, the policies in place in areas outside the city do have an impact. City officials felt that better collaboration with their suburban counterparts might be the key.

- ***Database management systems.*** One of the lessons learned was that there is a need for having basic information on assets and regulations easily accessible and updatable. Most of the cities do not have such systems in place, but what system would best work is uncertain.

- ***Integration is the key.*** While integration among divisions and agencies responsible for on-street parking policy, management, enforcement, and adjudication is important, how best to achieve this is unclear and requires further discussion.

- ***Meters that enforce themselves.*** As described in Section 3.4, technologies to do this already exist. However, additional analysis and assessments are needed to determine whether they should be implemented and how best to roll them out. Further, other technologies, like pay by phone or in-vehicle meters are likely to prove more optimal.

- ***Sliding scale fee/Use of PDAs for ADA permits.*** Dealing with abuses of ADA permits was cited by almost all the cities and how best to mitigate the problem is unclear. However, the two possibilities mentioned in Section 3.3 warrant further review.

- ***Variable message boards for on-street parking.*** More research is needed on the efficacy of signage. However, to deal with the problem of multiple regulations on signs or at spaces, one might make use of variable message boards which could be changed centrally at the press of a button. The technology for this already exists, and further study might be taken to determine its applicability for on-street parking.

4.3 Best Practices

During the peer-to-peer exchange session, several best practices were identified.

- ***Congestion/Value Pricing – New York City's Program for Commercial Parking***
  New York City's congestion pricing program for commercial parking has the makings of a best practice for the industry, not just in terms of what it is achieving but also with respect to the process by which the program was developed.

  The City began its incentive program in midtown to deal with commercial vehicles in October 2000. There were several thoughts behind it. First, was the question, "why should commercial vehicles have free parking when the public has to pay?" Second, there was a sense that the city was losing out on a key revenue source. However, beyond the financial concerns, the goal was to minimize tickets and get trucks to turn over the spaces.

  The program initially covered the area from 42nd Street to 57th Street, running north-south, and from 3rd Ave. to 8th Ave., running east-west. The program works as follows: There is a 3-hour time limit. To park for one hour costs $1, two hours costs $3, and three hours costs $6; the costs are not cumulative. Multi-space meters (pay/display) are utilized and spaces are clearly marked with signs. (The machines, made by SchlumbergerSema,[66] have keypads and contain the internal technology for entering license plate numbers. Once the policy decision is made to apply this technology, New York City Department of Transportation (NYCDOT) is prepared to move quickly to implement it.)

  In terms of acceptance, NYCDOT began by determining the companies with the highest rates of abuse (e.g. Poland Spring, Nabisco, Coca-Cola, UPS) and then setting up discussions with each of them. The program is win-win. For the businesses, if they receive a ticket for parking, it is a business loss; but if they have to pay for parking, they can deduct it as an expense. Also, the city sells debit cards with chips (smart cards) to the companies, which in turn give them to their drivers. The business can then track the drivers if they choose, and the drivers need not carry cash. For the City, enforcement is much easier and streamlined, summons rates have dropped significantly, and revenues have more than equaled the investment. (Initially, approximately

[66] See http://www.slb.com/Hub/Docs/SchlumbergerSema/ for information on the company.

$300,000 was invested in R&D and purchasing; this has been made up and the net FY05 projection is $10M.)[67]

The program is already a tremendous success and is being expanded to south to 34th Street and north to 59th Street, as well as East to Second Avenue and West to 9th Avenue.[68] Occupancy rates were 125% prior to the program and have been reduced to approximately 85% so there are many more places to park. Surveys prior to the program showed average parking time for loading/unloading was 4-6 hours; average parking time has now been reduced to about 90 minutes. The only problems that has been encountered is that the opposite side of the streets in the program area are still marked with "No Standing, 7am-7pm," so NYCDOT is finding ongoing misuse and double parked vehicles in those areas. The City is currently looking to expand the program and is exploring options to modify pricing dependent upon the size of the vehicle. They are also looking into implementing different hours of operation for different areas in the city, with downtown, for example potentially working on a 24-hour basis.

- ***Meter Technologies – Free Flow Parking, Smart Cards, In-Vehicle Meters, Pay by Phone***
  Many cities are moving toward free flow parking and smart card technologies, and with good reason. Cities that have begun using free flow parking or pay/display meters already see benefits in terms of maintaining revenues (since a customer can use another box if the closest one is broken), maximizing the number of spaces on a given street, and streamlining ticketing. Since keypads are available, additional functions can be built in to further streamline ticketing or to better monitor utilization of the spaces. Coupled with smart card technologies, such meters are a powerful tool.

  For those cities looking to integrate smart cards for parking and other types of transportation modes, they will eventually offer a one-stop card for the consumer, helping to make transportation seamless as a person moves from one mode to another. The potential for smart card technology is tremendous if one thinks about standardizing systems so that transportation could provide a sense of seamlessness not just for people moving within a city or from suburbs to city, but also from one side of the country to another.[69]

[67] Based on the discussion during the peer-to-peer exchange session, Boston, mA, June 12, 2002.
[68] Personal communication, John Girardi, 12 December 2002.
[69] During July 23-24, 2002, the Federal Highway Administration held the session, "Linking Planning and Management and Operations in Metropolitan Areas," in Chicago, IL. The topic of smart cards was discussed and there was genuine concern among the participants (drawn from city and state department of transportation or public works and from the local metropolitan planning organizations) that some standard be developed soon so as not to preclude the possibility of integrating transportation across the country.

Pay by phone and in-vehicle meter technologies offer additional benefits, including lower costs since cities need not pay for meters on the curb and the potential to utilize the same system in different cities across the country. The pay by phone technology, which allows customers to call a toll-free number when they are about to park and to call again when they are finished, is already being used in Seattle and Vancouver for off-street parking and is utilized for on-street parking in several European countries. In-vehicle meters, also used in many European cities as well as in Aspen and Arlington in the United States, work together with a pre-paid smart card and allow drivers to start their meter with the card and turn it off when they return.

- ***Institutional Cooperation and Collaboration – Chicago's Traffic Management Task Force***
  Chicago has a *Mayor's Traffic Management Task Force* that meets weekly to go over traffic concerns related to daily operations. Ongoing attendees include: Department of Transportation, traffic police, "streets and sand" (they put up/take down barricades, cones, message boards), sewer and water, museums and campuses, trolleys, etc. Additionally, any agency, organization, company, or other group related to major projects that affect traffic patterns is invited to the sessions when appropriate.

- ***Public Outreach – Boston's Program to Involve Merchants in Turn-Over Studies***
  Boston has an educational program that involves the merchants in conducting turn-over studies. By letting them track the turn-over in front of their businesses they begin to better understand the importance of encouraging it.

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Appendix A. Questionnaire on On-Street Parking Policy, Planning, and Operations•

Name and Title of Respondent(s) **Contact Point for Respondent(s) (tel, fax, email)**

Organization and City of Respondent(s) **Date Survey Completed**

Section A. Base Questions

1. Demographics

a. What is the resident population of your city? _____

b. What is the daytime (weekday) population of your city? _____

c. How many square miles is your city? _____ mi^2

d. How many square miles is your downtown?* _____ mi^2

e. Please define the geographic boundaries of your downtown. provide street limits (north, south, east, west)

f. By what types of public transit is your city served? (check all that apply)
☐ commuter rail ☐ light rail ☐ subways ☐ buses ☐ other (define)

g. What percentage of daily trips into the central city utilize public transit as the main mode of transport?_____%

2. Comparative Data

a. What is the average fee/fare per day to park off-street in the downtown area of your city? $_____

b. What is the average fee/fare for a trip to the downtown via transit from other points within the central city? $_____

c. What is the average fee/fare for a trip to the downtown via transit from outside the city? $_____

• ***Note that where a double underline appears, the participants were provided with a drop down box with choices.***

* For the purposes of this document, "downtown" is defined as the area of your city that includes the Central Business District as well as high-density commercial, institutional, retail, and residential development.

3. General Parking Data

a. What is the standard length of an on-street meter parking space (in feet)? _____ ft.

b. What agency (-ies) and division(s) oversee each of the following with respect to **on-street** parking?

- Enforcement _____
- Collections _____
- Purchasing of Signs and Meters _____
- Maintenance of Signs and Meters _____

c. What agency (-ies) and division(s) oversee each of the following with respect to **off-street** parking?

- Enforcement _____
- Collections _____
- Purchasing of Signs and Meters _____
- Maintenance of Signs and Meters _____

d. Please fill in the following grid related to number and type of parking spaces (if the answer to any category is *insufficient data* or *not applicable*, please note this specifically).

Type of Parking Space	**Number of On-Street Spaces**		**Number of Off-Street Spaces**	
	City-wide	Down-town	City-wide	Down-town
Total Number of Spaces				
Short-Term Metered				
Long-Term Metered				
Commercial Loading Zone				
Handicapped				
Residential Preferential				
Other Non-Metered, but Regulated				
Unregulated				
Other				

Section B. On-Street Parking Signs and Technologies

1. Signage – Communication

a. What is the main mode of communication utilized for your city's on-street parking signs? _____

b. Do on-street parking-related signs in your city generally communicate to the individual what **can** or **cannot** be done (e.g. ***No parking 8am – 11am*** v. ***Parking 11am – 5pm***)?_____

c. Does your city employ on-street parking signs that show multiple regulations (i.e. different sign codes) on one sign? ☐ Yes ☐ No

d. Does your city employ color coordinated signs for on-street parking? ☐ Yes ☐ No

2. Signage – Statistics

a. What is the total number of signs (excluding traffic regulatory and traffic warning signs) city-wide? _____

b. What is the total number of signs (excluding traffic regulatory and traffic warning signs) downtown?_____

c. How many types of parking signs (i.e. sign codes) does your city maintain? _____

d. What is the average size lettering on on-street parking-related signs (in inches)? _____ in.

e. What is the minimum size lettering on on-street parking-related signs (in inches)? _____ in.

3. Meters – Statistics

a. Does your city use meters for on-street parking? ☐ Yes ☐ No

If yes, please fill out the table below. (If no, skip to question 5)

Type of Meter Used	Number of Meters Used	
	City-wide	Downtown
Mechanical		
Electronic		
Electronic-Mechanical		
Pay/Display		
Other (specify)		
Single-head meters		
Double-head meters		

b. What is the standard meter fee per unit of time (e.g. 25¢ for 15 minutes)? _____

c. What are the hours and days of operation of standard meters? _____

d. What is the annual revenue collection from meters (not including fines)? $_____

e. What is the fine for a meter parking violation? (specify all that apply) $_____

f. What kinds of problems (if any) have you encountered with the types of meters currently in use? _____

g. How and by whom are the sites of meters determined? _____

h. From where does the funding come for purchasing on-street meters? _____

4. Meters – Maintenance

a. Is maintenance carried out by the city or is it under contract? _____

b. Does your city perform routine maintenance/inspections of meters? ☐ Yes ☐ No
If yes, how often is each meter routinely visited (excluding collections)? _____

c. How many technicians maintain on-street meters in your city (excluding collections)? ____

d. On average, what percent of your city's meters are working at a given time? _____%
How do you measure the accuracy/reliability of the figure above? _____

e. What systems/procedures, if any, do you have in place to alert you to a problem meter? _____

f. Has vandalism ever been a problem in your city? ☐ Yes ☐ No
If yes, please characterize the following: (If no, skip to question g)
- What has been the degree of the problem? _____
- What types of measures are currently in place or are planned? _____
- To what degree are current measures helpful? _____

g. Has theft of meter revenues ever been a problem in your city? ☐ Yes ☐ No
If yes, please address the following: (if no, skip to question 5)
- By whom? ☐ general public ☐ city staff ☐ contracted staff ☐ other
- What has been the degree of the problem? _____
- What types of measures are currently in place or are planned? _____
- To what degree are current measures helpful? _____

5. Non-Meter Technologies

a. What technologies, other than meters, are you aware of that fulfill functions typically provided by meters? (if none, skip to question 6) _____

b. If your city makes use of any of these technologies, please describe how and where. _____

C. On-Street Curb Management

1. General Management Questions

a. Does your city make use of value/congestion pricing for on-street parking? (e.g. changing fee for meters based on time of day; making meters closer to the downtown more expensive) ☐ Yes ☐ No
If yes, please describe how and where it is implemented. (if no, skip to question 2) _____

b. What is the standard time limit to park at the curb in your city? _____

c. Are there other time limits beyond the standard ones? ☐ Yes ☐ No
If yes, for each, please fill in following table: (if no, skip to question 4)

Time Duration	Metered or Non-metered	% of Total Spaces Allotted	Is this Considered Short-term or Long-Term Parking?

2. Preferential Parking Provisions

a. Does your city have residential preferential provisions for on-street parking? ☐ Yes ☐ No

If yes, please characterize the following: (if no, skip to question b)

- What is the fee for use of such spaces? $_____
- How many permits are issued on an annual basis? _____
- Where are the spaces located? _____
- What is the process for getting such spaces designated and who makes the decisions? _____
- How are these spaces marked on the street? _____
- What is the fine for a parking violation? $_____

b. On-Street Handicap access

- Do you require individuals with handicap placards/license plates to pay meters? ☐ Yes ☐ No
- Do you recognize handicap placards/license plates from other locales? ☐ Yes ☐ No
- Do you have specific marked zones along curbs for handicap parking? ☐ Yes ☐ No
- How are handicap locations determined? _____
- What is the fine for a parking violation of a handicap access space? $_____
- Please describe any problems with these spaces._____

c. Please fill out the following table on curb loading management policies for each type that applies to your city.

	Cabs	**Commercial Loading**	**Tour Buses**	**Valets**
How long can one use the space?				
What are the hours of operation?				
What is the fee for use of the space, if any?				
How are the zones marked on the street?				
How are sites determined and who decides?				
What is the fine for a parking violation?				
What problems, if any, are associated with these zones?				

d. Does your city employ any other types of on-street parking not previously described? ☐ Yes ☐ No
If yes, please characterize the following: (If no, proceed to Section C)

- What are the different type(s) of parking? _____
- How many spaces are allocated for each type noted above? _____
- Where are each of these types used? _____
- Why are each of these types used? _____

D. Enforcement and Fines

1. Please address the following with respect to the division of responsibilities for enforcement:

- Is enforcement carried out by the city or is it under contract? _____
- Who determines the number of enforcement personnel covering various districts? _____
- How many people are responsible for writing tickets for on-street parking on a given day? _____

- What is the ratio of supervisory staff (whom do not write tickets) to those writing tickets? _____
- What is the average size of a ticketing route (in city blocks)? _____ city blocks
- What is the estimated error rate of ticketing?* _____
- How is enforcement carried out? (check all that apply)
  ☐ tickets ☐ towing ☐ boots ☐ other (specify) _____
- Who tows? _____
- Are there different levels of enforcement depending upon the day of the week? ☐ Yes ☐ No
  If yes, why?_____

2. Please address the following with respect to fine structures.
- What are the annual revenues collected through on-street parking fines? $_____
- What is the collection rate for tickets? (Collection rate defined as: For all tickets issued, what is the percentage paid within a two-year period?) _____
- What regulatory systems/procedures/ordinances are there to increase collection rates? _____
- How and by whom are the fines determined? _____
- How are revenues collected from fines used? _____

Section E. Institutional Frameworks and Systems

1. Do you meet on a regular basis with a specific well-defined group to discuss matters related to on-street parking? ☐ Yes ☐ No

If yes, please describe the following: (if no, skip to question 2)
- Who (i.e. what agencies, institutions, etc.) is represented in this group? _____
- How frequent are the interactions? _____
- Is the process formalized or does it occur on an ad hoc or project-oriented basis? _____

2. Which of the following types of information related to on-street parking does your city have readily available? (if none, proceed to Section F)

☐ location/description of regulations ☐ location/description of asset inventory ☐ other (specify _____)

3. What form (system type) does the above information take? (check all that apply)

☐ word processing files ☐ spreadsheets ☐ paper files
☐ GIS/coordinate database ☐ database management system (specify software platform _____)
☐ other (specify _____)

4. How frequent are updates performed to the information contained in the system(s) above? _____

5. What degree of confidence do you have in the accuracy of the data supplied through the system(s) above? ____

* For the purposes of this document, "error rate" is defined as the number of tickets for which legally-required data fields have incomplete, incorrect, or illegible data.

F. Broad Issues and Trends Associated with On-Street Parking

1. Have there been streets in your city where previously **unregulated** parking was then **regulated**? ☐ Yes ☐ No

If yes, please address the following: (If no, skip to question 2)

- When was this done? _____
- Why was this done? _____
- What was the effect? _____
- Was the public informed prior to the changes? _____
- What was the public response? _____

2. Have there been streets in your city where previously **regulated** parking was then **unregulated**? ☐ Yes ☐ No

If yes, please address the following: (If no, skip to question 3)

- When was this done? _____
- Why was this done? _____
- What was the effect? _____
- Was the public informed prior to the changes? _____
- What was the public response? _____

3. Please characterize the interplay of on-street parking and land-use principles and practices in your city.

_____

4. Has there been thought given to integrating smart card or similar technologies so they can be utilized for parking as well as for other modes of transit? ☐ Yes ☐ No

If yes, please describe the process and goal. _____

5. As a result of September 11, 2001, how many on-street parking spaces have been lost in your downtown due to security concerns? _____ How many spaces lost in your city as a whole? _____

6. Please describe what you perceive to be the three most critical parking problems in your city, providing geographic boundaries where appropriate. _____

Thank you.

Appendix B. Selected Tables of Responses to the Questionnaire

Note: When reviewing the tables, a / or blank spot denotes lack of response to a question; i.d. means the city noted insufficient data; and n.a. means that a particular question is not applicable to that city.

Base Questions

A.1 DEMOGRAPHICS									
	Boston	**Chicago**	**Dallas**	**LA**	**NYC**	**Phoenix**	**Portland**	**San Fran**	**Wash DC**
Resident Population of the City	589,141	2,896,016	1,188,580	3,694,820	8,008,278	1,321,045	529,121	776,773	571,822
Weekly Daytime Population	1,600,000	3,300,000	i.d.	i.d.	i.d.	i.d.	i.d.	1,100,000	1,009,000
Square Miles of the City	50	228	384	472	322	485	145	47	61
Resident Population Density	11,783	12,702	3,095	7,828	24,870	2,724	3,649	16,527	9,374
Square Miles of Downtown	3	4	1.5	n/a	8.5	4.5	i.d.	2.3	0.7
% of Daily Trips Using Transit	46%	50%	33%	n/a	65%	20%	15%	61%	30%

Types of Public Transit	**Commuter Rail**	**Light Rail**	**Subways**	**Buses**	**Other**				
Boston	x	x	x	x	x	water shuttles			
Chicago	x		x	x	x	free trolleys/water taxis			
Dallas	x	x		x					
LA	x	x	x	x					
NYC	x		x	x	x	ferries/Roosevelt Island tramway (air train)			
Phoenix				x					
Portland		x		x	x	street cars			
San Fran	x	x	x	x					
Wash DC	x		x	x					

Geographic Boundaries of Downtown	
Boston	Charles River (N), Mass Ave (W), Mass Tpk & Herald St (S), Boston Harbor (E)
Chicago	Division St (N), Halsted St (W), Roosevelt Rd (S), Lake Michigan (E)
Dallas	Woodall Rodgers Freeway (N), Stemmons Freeway (W), R.L. Thornton (S), Julius Schepps Freeway (E)
LA	College Home St. (N), Burlington Ave (W), 17th St (S), Ceter St. (E)
NYC	60th St (N), Hudson River (W, S), East River (S, E)
Phoenix	see description in survey for upside down T
Portland	I-405 freeway (N, W, S), Willamette River (E)
San Fran	no answer provided
Wash DC	Mass Ave (N), 15th St, NW (W)*, Constitution, PA Ave, NW (S), North Capitol St, Louisiana Ave (E)

A.2 COMPARATIVE DATA									
	Boston	**Chicago**	**Dallas**	**LA**	**NYC**	**Phoenix**	**Portland**	**San Fran**	**Wash DC**
average fee for off-street parking	$15/$28	$ 18.00	$ 4.75	n.a.	$40/$29	n.a.	$ 7.25	$ 20.25	$ 11.50
average fare - transit from in city	$ 1.00	$ 1.50	$ 1.00	n.a.	$ 1.50	n.a.	$ 1.55	$ 1.00	$ 1.10
average fare - transit outside	$ 3.00	$ 2.50	$ 2.00	n.a.	i.d.	n.a.	$ 1.55	$ 3.00	$ 1.56

A.3 GENERAL PARKING DATA									
	Boston	**Chicago**	**Dallas**	**LA**	**NYC**	**Phoenix**	**Portland**	**San Fran**	**Wash DC**
std length of meter space (ft)	20	20	21	20	19-22	17/22	20	20	20
agencies that oversee…	**On-Street Enforcement**	**Off-Street Enforcement**	**On-Street Collections**	**Off-street Collections**	**On-Street Purchasing**	**Off-Street Purchasing**	**On-Street Maintenance**	**Off-Street Maintenance**	
Boston	DOT, Boston Police, Misc. Police	DOT (municipal); Fire, Inspectional Services (pay)	DOT (Office of Parking Clerk)	DOT (municipal); Fire, Inspectional Services (pay)	DOT (Operations + A&F)	DOT (municipal); Fire, Inspectional Services (pay)	DOT (Operations)	DOT (municipal); Fire, Inspectional Services (pay)	
Chicago	Police, Revenue	Consumer Services, Police, Park District Sec., Revenue, Contracted Operator	Revenue	Revenue, Contracted Operator	DOT, Revenue	DOT, Revenue, Contracted Operator	DOT, Revenue	DOT, Revenue, Contracted Operator	
Dallas	Public Works & Transportation-PWT (Parking Mgmt)	PWT (Parking Enforcement)	PWT (Parking Mgmt), sub-contractor	PWT (Ticket Processing & Collections)	PWT (Signs, Field Operations; Meters Parking Mgmt.	PWT	PWT (Signs, Field Operations; Meters Parking Mgmt.	PWT	
LA	Bureau of Parking Enforcement & Intersection Control	Bureau of Parking Enforcement & Intersection Control	Bureau of Parking Regulations & Special Operations	Bureau of Parking Regulations & Special Operations	Bureau of Field Operations, BPSO	Bureau of Field Operations, BPSO	Bureau of Field Operations, BPSO	Bureau of Field Operations, BPSO	
NYC	NYPD, DOT (Parking Control Div.)	NYPD, DOT (Parking Control Div.)	DOT (Parking Bureau)	garages - private; fields - DOT	DOT (Parking and Traffic Bureaus)	DOT (Parking Bureau)	DOT (Parking and Traffic Bureaus)	DOT (Parking Bureau)	
Phoenix	Police	Police (municipal)	Finance	Finance (municipal)	DOT	DOT (no airport)	DOT	DOT (no airport)	
Portland	DOT (Parking Enforcement)	City of Portland (Bur. General Services)	DOT (Parking Operations)	City of Portland (Bur. General Services)	DOT (Parking Operations)	City of Portland (Bur. General Services) - oversight of pvt contract	DOT (Bureau of Maintenance)	City of Portland (Bur. General Services) - oversight of pvt contract	
San Fran	Parking & Traffic-DPT (Enforcement)	DPT (Enforcement) for lots	DPT oversight	private operator	DPT (Operations)	DPT (Operations)	DPT (Operations)	DPT (Operations)	
Wash DC	Public Works (DPW) and Police	ACS	DDOT	DDOT (signs); ACS (meters)	DPW and Police	ACS	DDOT	DDOT (signs); ACS (meters)	

A.3 GENERAL PARKING DATA - continued

total breakdown of spaces	#on-street citywide	#on-street downtown	#off-street citywide	#off-street downtown					
Boston	i.d.	i.d.	140,000	51,500					
Chicago	27,695	8,000	31,000	2,100					
Dallas	4,176	1,431	1,070*	1,070					
LA	i.d.	i.d.	10,355	200					
NYC (metered only)	63,000	i.d.	14,600	i.d.					
Phoenix	i.d.	i.d.	i.d.	i.d.					
Portland	i.d.	47,394	i.d.	36,645					
San Fran	320,000	i.d.	225,000	58,000					
Wash DC	260,000	i.d.	i.d.	67,952					

Specific Breakdown of spaces	city on-street short term/long term meter	downtown on-street short term/long term meter	city off-street short term/long term meter	downtown off-street short term/long term meter	on-street commercial/ handicap/ residential	off-street commercial/ handicap/ residential	on-street nonmeter, regulated/ unregulated	off-street nonmeter, regulated/ unregulated	other
Boston	2,000/not applic.	4,000/1,000	not applic.	not applic.	id./i.d./12,000 city; 4,000 downtown	not applic/i.d./ not applic	i.d./i.d.	i.d./1,550	i.d.
Chicago	i.d./i.d.	i.d./i.d.	i.d./i.d.	i.d./i.d.	~5,800 city; ~3,000 downtown////	i.d.///	i.d./i.d.	i.d./i.d.	not applic.
Dallas	1,906/2,207	1,127/304	88/982	88/982	i.d./10 (downtown)/i.d.	i.d./i.d./0	i.d./0	i.d./0	/
LA	i.d./i.d.	i.d./i.d.	1,430/1,429	i.d./i.d.	i.d./i.d.	i.d./352 city; 6 downtown/ not applic	i.d./i.d.	5,771city; 200 downtown/603 city	1,011 city
NYC	57,000/6,000	i.d./i.d.	2,800/11,800	i.d./i.d.	i.d./none/none	i.d./365 city/none	not applic.	not applic.	not applic.
Phoenix	i.d./i.d.	i.d./i.d.	i.d./i.d.	i.d./i.d.	i.d./i.d.	i.d./i.d.	i.d./i.d.	i.d./i.d.	i.d./i.d.
Portland (all downtown numbers)	i.d./i.d.	4,546/514	i.d./i.d.	4,000/32,645	886/5/0	0/not applic	143/0	0/0	0
San Fran (city-wide unless noted)	22,000/0	7,000/0	700/0	i.d./i.d.	3,900 city/500/~65,000	i.d./i.d./0	2,000/226,000	i.d./i.d.	0
Wash DC	11,000/369	450/3,000	i.d./i.d.	i.d./i.d.	i.d./i.d./120,000 city; 3,150 downtown	i.d./i.d./i.d.	i.d./i.d.	i.d./i.d.	not applic.

B.1 Signage - Communication									
	Boston	**Chicago**	**Dallas**	**LA**	**NYC**	**Phoenix**	**Portland**	**San Fran**	**Wash DC**
main mode of communication	both	both	words	words	both	/	both	words	both
can/cannot be done	cannot	cannot	cannot	cannot	cannot	cannot	can	both	both
multiple regulations	yes	no	yes	yes	yes	no	no	yes	no
color coding	yes	yes	yes	yes	yes	RPP only	yes	yes	yes
B.2 Signage - Statistics									
	Boston	**Chicago**	**Dallas**	**LA**	**NYC**	**Phoenix**	**Portland**	**San Fran**	**Wash DC**
total # signs in city	~200,000	i.d.	88,400	/	600,000	i.d.	~80,000	103,000	225,000
total # signs downtown	~100,000	i.d.	i.d.	/	>650	i.d.	i.d.	i.d.	i.d.
total # sign codes	~300	270	20	/	>200	i.d.	450	>100	609
average size lettering (inches)	1	2	2.75	/	1.5	2	/	2.5	1.5
minimum size lettering (inches)	0.25	1.5	0.75	/	1	1.5	/	0.5	0.75
average # signs/square mile	4,000	i.d.	230	i.d.	1,863	i.d.	552	2,191	3,689
B.3 Meters - Statistics									
	Boston	**Chicago**	**Dallas**	**LA**	**NYC**	**Phoenix**	**Portland**	**San Fran**	**Wash DC**
meters used?	yes	yes	yes	yes	yes	yes	yes	yes	yes
standard fee/unit of time	$.25/15 min	$.25/15min	multiple	/	multiple	$.60/60min	$.25/25min	multiple*	$1/60min
hours of operation	8am-6pm	9am-9pm	7am-6pm	8am-6pm	multiple	8am-5pm	multiple	7/9am-6pm	9:30am-4:30pm
days of operation	/	/	M-Sat	M-Sat	multiple	M-F	multiple	M-Sat	M-F
annual revenue collection	$8.6M	$17.4M	$2.9M	$20.5M	$75M	n.a.	$7.5M	$13M	$10M
fine for violation	$25*	$30-50	$20	$30	$25-$55*	$16*	$16*	$25-35*	$20
fee per minute to park	$0.017	$0.017				$0.010	$0.010		$0.017
Types of meters (city/downtown)	**Boston**	**Chicago**	**Dallas**	**LA**	**NYC**	**Phoenix***	**Portland**	**San Fran**	**Wash DC**
mechanical	0	11,300/0	0	0	16,000/i.d.	n.a./973	0	20,000/i.d.	0
electronic	3,400/4,600	17,450/8,000	4,274/2,285	40,000/7,611	47,000/i.d.	n.a./1,153	i.d./2,000	1,800/i.d.	14,869/3,993
electronic-mechanical	0	i.d.	0	0	i.d./i.d.	0	i.d./4,300	0	0
pay/display	0	29/0	0	2/0	670/i.d.	0	0 (150)*	0	0
other	0	0	0/13 (slot box)	0	0	0	0	0	0
single head	2,300/1,500	28,000/7,800	4,274/2,285	32,241/7,611	i.d./i.d.	n.a./2,198	0/1,138	20,500/i.d.	i.d.
double head	4,700/3,100	800/200	0	48/0	i.d./i.d.	n.a./116	0/2,395	1,100/i.d.	i.d.

B.3 Meters - Statistics continued

Funding and Decisions	How is Meter Site Detemined	Who Determines	Funding Source
Boston		Engineering, with Planning	Capital budget
Chicago	ordinance	Revenue Dept.	Corporate Budget
Dallas	staff recommendation	staff	general fund
LA		DOT - Meter Planning Section	existing meters, off-street lot revenue
NYC	surveys, studies, community requests	DOT Parking Engineering	NYC Capital funds
Phoenix	cooperative effort	adjacent business, traffic operations, investigators, parking meter staff	general fund
Portland		DOT, Parking Operations and Parking Control Div.	credit and financing of debt
San Fran	analysis, public hearing, resolution, mayor signs	DPT Engineering and public	meter revenue
Wash DC	rulemaking		general fund

Types of Problems w/Meters	vandalism	software functionality or support	coins jam or don't register	theft	counting to reconcile	power supply	reliability	no spare parts/not made now	case lock problems
Boston	x	x	x						
Chicago			x		x				
Dallas						x			
LA	x					x	x		
NYC (none reported but see below)									
Phoenix			x			x			x
Portland		x	x			x		x	
San Fran	x			x					
Wash DC		x							

B.4 Meters - Maintenance

	Boston	Chicago	Dallas	LA	NYC	Phoenix	Portland	San Fran	Wash DC
who carries out maintenace	city	city	city	city	city	city	city	city	under contract
routine maintenace performed?	yes	yes	yes	yes	yes	yes	yes	yes	no
how often is routine maintenance	weekly	weekly	quarterly	weekly	weekly	weekly or >	annually	every 4th day	not applic.
how many technicians	0 to 10	11 to 20	0 to 10	21 to 30	>50	2	0 to 10	20	i.d.
what % working at given time	75%	95%	97%	94%	90%	95%	95%	85%	i.d.
how is this measured	inspections	repaired/total	random sampling	surveys	field reports	knowledge of equipment	see doc*	repair records*	not applic.

B.4 Meters - Maintenance continued

Systems in Place to Alert to Meter Problem	inspections	parking ticket appeals	consumer call-in line	repair records					
Boston	x	x							
Chicago			x						
Dallas	x								
LA	x		x						
NYC	x		x						
Phoenix	x		x						
Portland	x		x						
San Fran			x	x					
Wash DC			x						

	Boston	Chicago	Dallas	LA	NYC	Phoenix	Portland	San Fran	Wash DC
has vandalism been a problem	yes	yes	no	yes	yes	yes	yes	yes	yes
what is the degree of the problem	>50%	<10%	not applic.	>50%	>50%	<10%	<10%	serious	41-50%
has theft been a problem	yes	yes	no	no	yes	no	yes	yes	yes
what is the degree of the problem	/	i.d.	not applic.	not applic.	i.d.	not applic.	<10%	very large	21-30%

Theft has been carried out by whom	public	city staff	Contract staff	other					
Boston	x	x							
Chicago	x	x	x						
Dallas (none reported)									
LA (none reported)									
NYC	x	x	x						
Phoenix (none reported)									
Portland				x					
San Fran	x	x	x	x					
Wash DC	x								

B.4 Meters - Maintenance continued

What technologies are you aware of that fulfill the role of meters (use)	chalked tires	parking vouchers	pay stations	smart cards	in-vehicle meters	cell phone payment	multi-space units	pay/display	pay by plate
Boston							x	x	
Chicago				x		x		x	x
Dallas							x (x-plans)		
LA									
NYC									
Phoenix									
Portland			x (x)	x	x	x			
San Fran	x (x)	x							
Wash DC									

C.1 General Management Questions									
	Boston	**Chicago**	**Dallas**	**LA**	**NYC**	**Phoenix**	**Portland**	**San Fran**	**Wash DC**
value pricing?	no	yes - outward zones cheaper	yes - outward zones cheaper, and max. time increases in areas where turnover not critical	yes - high demand areas are more expensive	yes - example of the commercial vehicles	no	no	yes - outward zones cheaper	yes - outward zones cheaper
standard time limit	2 hours	2 hours	2 hours	2 hours	1 hour	48 hours*	/	1 hour	2 hours
other time limits?	yes	yes	yes	yes	yes		yes	yes	yes
Non-Standard time limits									
Boston	4 hrs. (10%)								
Chicago	15 min and 30 min loading zones								
Dallas	30 min, 2 hour, 4 hour, 10 hour, 12 hour								
LA									
NYC	1 hour (56%); 2 hour (40%); 3 hour, 4 hour, 6 hour, 12 hour (1% each)								
Phoenix									
Portland	15 min; 1 hour; 90 min; 2 hour; 3 hour; 5 hour								
San Fran	30 min. standard in downtown; mostly 1 hour; some 2 hours; very few 4 hour; 4 zones: $.75/30 min; $1/hour; $.50/hour; $1/hour								
Wash DC	1 hour, nonmetered short-term; 2 hour nonmetered short-term; 1 and 2 hour metered short-term; and 3 and 4 hour metered long-term								

C.2 Preferential Parking Provisions									
	Boston	**Chicago**	**Dallas**	**LA**	**NYC**	**Phoenix**	**Portland**	**San Fran**	**Wash DC**
residential parking	yes	yes	yes	yes	no	yes	no	yes	yes
fee	$0	$35/yr +$.20/day	$6	$15*	not applic.	$10*	not applic.	$27	$10
# permits annually	68,600	/	100	183,000	not applic.	2,500	not applic.	89,000	i.d.
where are spaces located	downtown and some outlying neighborhoods	citywide	areas near clubs, restaurants, etc.	residential frontage	not applic.	23 different areas	not applic.	on-street	residential areas
process	petition w/approval by city council	Dept. of Revenue assessment*	petition requires 2/3rds resident approval, survey requires 60% occupancy and 20%	petitions, surveys, hearings, City Council approval	not applic.	see survey attachm't	not applic.	petition, review, hearing, board and mayoral approval	petition w/approval by city council
how marked	signs	signs	signs	signs	not applic.	signs	not applic.	signs	signs
fine for violation	$30	$50	$30	$35	not applic.	$16	not applic.	$33	$20
on-street ADA access									
do they pay meters	no	no	no	no	no	yes	yes	no	no
recognize from other locales	yes	yes	yes	yes	no	yes	yes	/	yes
specific marked zones	yes	yes	yes	yes	no	no	yes	yes	/
how determined	public request to City Disability Commission	state designation and City Council approval	high demand or requests	street width and available access	not applic.	request, field inspection	not applic.	request and review	limited spaces at gov't buildings
fine for violation	$75	$150	$100	$330	$180	$40	$190-$450	$275	$250
2000 Census -median household income	$42,117	$38,295	$36,030	$35,611	$39,686	$40,003	$38,807	$57,417	$41,162
ADA fine/med. Household inc.	0.18%	0.39%	0.28%	0.93%	0.45%	0.10%	0.49-1.16%	0.48%	0.61%

C.2 Preferential Parking Provisions continued

Problems w/ADA Parking	dubious spots	loose regulations at state level	abuse of placards (use by non-ADA persons, not transporting person to space vehicle has parked in)	use of ADA spots for long term parking					
Boston	x		x						
Chicago		x	x						
Dallas			x	x*					
LA (none reported)									
NYC (none reported)									
Phoenix (not aware of any)									
Portland		x	x						
San Fran			x						
Wash DC			x						

Cabs	Boston	Chicago	Dallas	LA	NYC	Phoenix	Portland	San Fran	Wash DC
how long can space be used	no limit	no limit	unlimited	/	specified on sign	pick up/drop off only	15 min.	no limit	no limit
hours of operation	24 hours	24 hours	24 hours	/	9am-7pm	24 hours	24 hours	24 hours	varied
fee for space	none	unknown	none	/	avg. $.25/15 min	none	none	none	none
how are zones marked on street	signs	signs	signs	/	signs	signs, painted curbs	signs, street markings	signs, painted curb	signs
how are sites determined	DOT Enginner & police	Alderman	Traffic Engineer	/	surveys, DOT parking	adjacent business	parking control	public request, engineer review	parking specialist by rulemaking
what is fine for violation	$30	$25-$100	$25	/	$25-$55	/	$35	$50	$20
what problems	none	double parking by cabbies	cabs extending beyond zones	/	abuse	most businesses don't want	overflow, abuse, competition	not used, cabs extend beyond zones	none

C.2 Preferential Parking Provisions continued

Commercial Loading	Boston	Chicago	Dallas	LA	NYC	Phoenix	Portland	San Fran	Wash DC
how long can space be used	30 minutes	30 min	30 min.	30 min	specified on sign	30 min	30 min	30 min	loding & unloading
hours of operation	varied*	varied	7am-6pm	8am-6pm	8am-6pm	24 hours*	varied*	7am-6pm, MF	varied
fee for space	$20/linear ft.	varied	$25	/	graded*	none	none	metered	none
how are zones marked on street	signs	signs	signs, painted curb	signs, painted curb	signs	signs, painted curb	signs, street markings	signs, painted curb	signs
how are sites determined	Engineering	Alderman	Traffic Engineer	request from adjacent properties	surveys, DOT parking, Borough engineering	adjacent business & DOT	parking control	public request, engineer review	parking specialist by rulemaking
what is fine for violation	$30	$25-$100	$20 or $30*	/	$55	/	$25-$40	$50	$50
what problems	noncommercial use spaces	payee thinks the area is exclusive	time consuming to mark	none	abuse	trucks stay longer than needed	overtime, abuse	non delivery vehicles use long-term	none

Tour Buses	Boston	Chicago	Dallas	LA	NYC	Phoenix	Portland	San Fran	Wash DC
how long can space be used	15 minutes	none specified	unlimited	/	not applic.	not applic.	no limit*	varied	15min-4hrs
hours of operation	24 hours	varied	24 hours	/	not applic.	not applic.	24 hours	varied	9:30-4pm MF
fee for space	none	none	none	/	not applic.	not applic.	none	none	metered or free
how are zones marked on street	signs	signs	signs	/	not applic.	not applic.	signs, street markings	signs, painted curb	signs
how are sites determined	Engineering	Alderman	Traffic Engineer	/	not applic.	not applic.	parking control	public request, engineer review	curbside managm't division
what is fine for violation	$30	$25-$100	$25	/	not applic.	not applic.	$40	$100	$20
what problems	where to locate, excessive idling	not applic.	insufficient space for large buses	/	not applic.	not applic.	underused (use hotels, double park)	adjacent properties object to buses/fumes	insufficent # for peak demand, idling

C.2 Preferential Parking Provisions continued

Valets	Boston	Chicago	Dallas	LA	NYC	Phoenix	Portland	San Fran	Wash DC
how long can space be used	10 or 15 min	varied	5 min	/	not applic.	not applic.	not applic.	5 min	i.d.
hours of operation	varied*	varied	specified on sign	/	not applic.	not applic.	not applic.	when business open	i.d.
fee for space	$40/linear ft	varied	$375/2 spaces; $1000 each addtl.	/	not applic.	not applic.	not applic.	$40/yr	i.d.
how are zones marked on street	signs	signs	signs	/	not applic.	not applic.	not applic.	signs, painted curb	i.d.
how are sites determined	Engineering & Off-Street Pkg	Alderman	Traffic Engineer after application	/	not applic.	not applic.	not applic.	public request, engineer review	i.d.
what is fine for violation	$30	$25-$100	$30	/	not applic.	not applic.	not applic.	$50	i.d.
what problems	parking cars in neighborhoods	double parking	"everything!"- stacking vehicles, parking in zones, etc.	/	not applic.	not applic.	not applic.	vehicles park long-term	i.d.

Other types of parking	Boston	Chicago	Dallas	LA	NYC	Phoenix	Portland	San Fran	Wash DC
Other types of parking	gov't reserved, 10 min pickup/dropoff	tow away zones, horse carriage, limited hr. parking	horse carriage	not applic.	authorized, street cleaning	not applic.	hotel zones - 5-10 min limit	vanpool, carpool, motorcycle	/
how many spaces allocated	i.d.	varied	varried	not applic.	not applic.	not applic.	75 spaces	50, 50, 400	/
where used	city wide	city wide	entertainment area	not applic.	city wide	not applic.	hotels	major institutions	/
why used	no other choices, utility becoming apparent	deliver goods/services, drop off children, ease traffic flow	tourist	not applic.	various areas	not applic.	check in and check out	to encourage carpooling, vanpooling	/

Enforcement and Fines

D.1 Division of Responsibilities

	Boston	Chicago	Dallas	LA	NYC	Phoenix	Portland	San Fran	Wash DC
enforcement by city or contract	city	city	city	/	city	city	city	city	city
who determines # of personnel	DOT	police, revenue	supervisor	enforcement captain*	DOT, parking control	police	DOT (parking enforcement)	director of enforcement	DPW
how many people write tickets	150	/	19 to 22	/	40	6 (dntwn.)	30	232	167
supervisory staff/those writing tickets	1/5	/	1/8	1/8	1/8	1/6	1/8	1/9	1/13
average size of ticketing route (city block)	6 to 10	/	16 to 20	/	16 to 20	30	6 to 10	6 to 8	i.d.
estimated error rate of ticketing	2.1%-4%	/	0-2%	0-2%	4.1-6%	3%	0-2%	/	0-2%
who tows	DOT, Police Tow Contractors	city, city contractor	city contracted trucks	traffic officers, city contractors	NYPD	tow companies	pvt company under city contract	contractor	DPW and contractors
different levels of enforcement?	no	yes - regulations	yes - political constraints	yes, regulations	yes, other	yes	yes, other	yes, many officers off Sun & Mon	yes, regulations

how is enforcement carried out	Tickets	Towing	Boots	Other
Boston	x	x	x	x
Chicago	x	x	x	
Dallas	x	x	x	
LA	x	x	x	
NYC	x			
Phoenix	x	x	x	
Portland	x	x		
San Fran	x	x	x	
Wash DC	x	x	x	

D.2 Fine Structures									
	Boston	**Chicago**	**Dallas**	**LA**	**NYC**	**Phoenix**	**Portland**	**San Fran**	**Wash DC**
annual revenues collected through fines	$56M	$112M	$5.4M	$92.68M	/	not avail.	$2.5-3M	$57M	$44M*
collection rate for tickets	90%	60%	70%	74.60%	/	not avail.	/	75-80%	70%
systems/procedures/ordinances	late fees, seizure/boot non-renewal of license + $ penalty	booting, license suspension	notices, booting, towing	additional fees, boots, tows, license nonrenewal	/	council ordinance	currently implementing use of collecation agency	nonrenewal of registration or residential parking permits, towing, booting, out-of-state collection program	boots
how/by whom fines determined	DOT, City Council approval	City Council	city council	city council	/	city council	proposed by City, approved by state district court	board of supervisors, staff recommendation	legislation, regulation
how are revenues from fines used	general fund	City corporate fund	general fund	general fund	/	general fund	Office of Transportation	Metropolitan Transportation Agency (municipal railway)	transit subsidy, general fund

E.1 Institutions									
	Boston	**Chicago**	**Dallas**	**LA**	**NYC**	**Phoenix**	**Portland**	**San Fran**	**Wash DC**
do you meet on regular basis	no	yes	yes	no	yes	no	yes	yes	no
with whom	not applic.	bureau heads	West End Assoc.	not applic.	other DOT units, NYPD	not applic.	Business - Association for Portland Progress Transportation Committee; Residents - Downtown Community Assoc.; other neighborhood associations	deputy directors	not applic
how frequent	not applic.	weekly	monthly	not applic.	monthly	not applic.	>1/week	~ monthly	not applic
formalized or ad hoc	not applic.	formalized	ad hoc	not applic.	formalized	not applic.	ad hoc	ad hoc	not applic

E. 2 -5 Systems									
what information is available	**location/ description of regulations**	**location/ description of asset inventory**	**other**						
Boston			x (variable)						
Chicago	x								
Dallas	x	x							
LA (none reported)									
NYC	x								
Phoenix		x (meters only)							
Portland	x	x							
San Fran	x	x							
Wash DC	x								

E. 2 -5 Systems continued

what forms/system types	word processing files	spreadsheets	paper files	GIS/ Coordinate Database	Database Management System	Other			
Boston	x		x			x (intelligent video)			
Chicago			x		x (Paradox and Access)				
Dallas		x	x						
LA (none reported)									
NYC	x	x	x		x				
Phoenix (unknown)									
Portland	x	x	x	x					
San Fran			x						
Wash DC			x						

accuracy of systems	Boston	Chicago	Dallas	LA	NYC	Phoenix	Portland	San Fran	Wash DC
how frequent are updates	irregular	monthly	daily	daily	daily	high	daily	as occur	
what degree of confidence in accuracy	low	high	high	high	high	high on # meters, less on what type of meter is where	high	90-95%	

F.3 Characterize the Interplay of On-Street Parking and Land Use principles/practices in your city	
Boston	Parking is tailored to land use needs. Easier in areas with more single space use, like financial or theater districts. Areas/corridors with heave mixed use, like retail or residential, are more difficult and thus, multiple regulations are utilized.
Chicago	On-street parking limited in downtown loop, but available; with 9/11 even more limited so land-use demands greater.
Dallas	no response
LA	no response
NYC	Most of the business districts in NYC have meters. Any trip generator usually warrants on-street management.
Phoenix	On-street parking supports adjacent land-use
Portland	Parking restrictions in downtown since 1975. For air quality reasons, parking ratio for garages was changed to .7 spaces per 1,000 sq. ft. of leasable floor area. The result was a turn to alternative transportation programs. Prohibition lifted almost 4 years ago but restrictions remain.
San Fran	Commercial areas highly regulated
Wash DC	In general areas with zoning designations that are predominately commercial have metered parking and areas with zoning designations that are predominately or exclusively residential are not metered. There are, of course, exceptions. areas where the zoning encourages high-density residential uses are sometimes metered, because of their proximity to commercial areas. In such areas, there are often some unmetered-spaces where parking for longer than 2 hours between 7:00 am and 8:30 or 10:00 pm is limited to those possessing residential parking permits for that area.
	Except in locales with lower density (rowhouse and less) residential zoning, street parking is expected to serve only relatively short-term users. The pricing and timing-limitations of parking in commercial areas is intended to encourage the impression that there may be street-parking available for potential patrons of businesses where the typical visit is anywhere from 15 minutes to two hours, even if such parking actually may be scarce. There is an attempt to balance the implicit encouragement of vehicular use by transit-system ads and outreach,that eoncourage transit patronage for commuting, special events, and some shopping and services
	Within the last two years, the City has begun to grapple with developing new, more coherent policies with respect to parking and transit oriented development. We continue to recognize that smaller shop-owners, especially outside the CBD, need the public to have the impression that on-street parking may be available.
	However we are increasingly seeing the use of streets for vehicular storage as an inefficient use of expensive public space that could otherwise be be used for improving the transportation and mobility function of the streets. This was one of the principal themes of a recent Mayoral task force on TOD, and is something the new transportation director is acutely aware of. We are considering new busways or LRT lines that may require the elimination of surface parking in some commercial and in some moderate to high-density residential areas. The replacement of such surface parking with structured parking will likely make advisable, higher-density development in the affected areas.
	However, the public discussion of the trade-offs has not begun, and the government anticipates the conversation will be difficult. We have not yet sorted out our policies for determining the resultion of conflicts between the provision of off-street parking, and the need to maximize the transportation and investment return on the existing and planned transportation infrastructure. When choosing a route to recommend as a starter-line for a new LRT or BRT system, decisionmakers shied away from one particular line due, to some extent, to the desire to avoid the on-street parking question from diminishing the early acceptance of the transit proposal.

F.4 and F.5 Smart Cards and 9/11										
	Boston	**Chicago**	**Dallas**	**LA**	**NYC**	**Phoenix**	**Portland**	**San Fran**	**Wash DC**	
smart cards?	yes, 1998 pilot program	yes, looking for a city-wide card*	yes, testing multi-space units that accept credit and debit cards	no*	yes, pre-paid debit cards available	yes, looking into using them for value pricing	yes, introduction of space meters, with credit/ debit and smart cards	yes	yes, new meters accept credit cards; smart card being considered for next round	
how many spaces lost downtown	100	/	40	i.d.	i.d.	/	see survey	/	many	
how many spaces lost in city	100	/	40	i.d.	i.d.	175-200*	~24*	/	i.d.	
% spaces lost in downtown			3%							