July 2012

Impact of Parking Supply and Demand Management on Central Business District (CBD) Traffic Congestion, Transit Performance and Sustainable Land Use

A Study of the Impact of Parking Supply and Demand Management

FINAL REPORT

Final Recommendations for Parking Supply and Demand Management in Project CBDs

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METRIC CONVERSION TABLE

APPROXIMATE CONVERSIONS TO SI UNITS

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
LENGTH				
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
AREA				
in^2	square inches	645.2	square millimeters	mm^2
ft^2	square feet	0.093	square meters	m^2
yd^2	square yard	0.836	square meters	m^2
ac	acres	0.405	hectares	ha
mi^2	square miles	2.59	square kilometers	km^2

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
LENGTH				
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
AREA				
mm^2	square millimeters	0.0016	square inches	in^2
m^2	square meters	10.764	square feet	ft^2
m^2	square meters	1.195	square yards	yd^2
ha	hectares	2.47	acres	ac
km^2	square kilometers	0.386	square miles	mi^2

Source: FHWA, 2011b

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16. Abstract

   Local officials often consider parking problems in downtown areas to be the result of inadequate, inconvenient or expensive parking. This perspective suggests that the best solution to parking problems is to increase parking supply without directly charging the end-user. While decision-makers and planners have long accepted that we cannot build our way out of congestion (see, e.g., Downs, 1992), we paradoxically believe that we can solve the parking problem by adding more parking spaces, which is the equivalent of adding additional capacity on a congested roadway. Traffic congestion remains a major long-term concern in the Central Business Districts (CBDs) of Miami and Fort Lauderdale. This research explores the diverse range of parking supply and demand management strategies that could be used to address congestion associated with parking in the Miami and Fort Lauderdale CBDs.

   This research explores the connection between parking supply and demand management strategies and transportation system outcomes - congestion management (cruising for parking and underpricing of parking), Transportation System Management (TSM) and Transportation Demand Management (TDM), revenue streams, transit use and performance, and sustainable land use – to make recommendations for Miami and Fort Lauderdale CBDs.

   This research uses mixed methods, including literature reviews of best practices, field studies of the current parking inventory and parking rates, case studies of peer and model cities, interviews with decision-makers in Miami and Fort Lauderdale, and presentations to advisory committees and other stakeholder groups. Recommendations are made in the following nine strategy areas: pricing to manage demand; funding; land use planning; coordination of transportation and land use; coordinated parking policies for alternative modes of accessibility; regulation of parking providers; design and technology; improving public education through social marketing; and institutional coordination of parking, transportation and land use. While many of the proposed solutions require action on the part of local governments, the study reveals the complex network of stakeholders involved in addressing current and future needs related to mobility in the study areas, including developers, lenders, local and regional advisory boards, and transit providers.

17. Key Word Parking, Congestion Management, Coordination, Multimodal, Land Use, Transit, TDM, TSM,		**18. Distribution Statement**	
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PROJECT SCHEDULE

This final report presents the recommendations developed based upon research that is documented in six technical memoranda that have been prepared as a part of this project. The first technical memorandum explored the relationship between parking cost structure and congestion management outcomes.   The second technical memorandum explored the best practices in travel demand management (TDM) and transportation system management (TSM) strategies. The third technical memorandum looked at the impact of parking supply and demand management on parking and other revenue streams. The fourth technical memorandum explored the impact of parking supply and demand management strategies on transit use and performance. The fifth memorandum analyzed the sustainability of land use patterns and regulations in the study area. The sixth memorandum summarized the results of stakeholder workshops and presentations in the project CBDs. This final report presents recommendations regarding approaches to parking management in the project CBDs and is supplemented by an expanded Executive Summary and an Implementation Plan for Downtown Ft. Lauderdale. The dates on which the technical memoranda were completed is shown below.

Technical Memorandum #1 Determine the Impact of Parking Supply/Demand Management on Congestion Management Outcomes	May 2010
Technical Memorandum #2 Determine the Impact of Parking Supply/Demand Management on TDM and TSM Strategies	July 2010
Technical Memorandum #3 Determine the Impact of Parking Supply/Demand Management on Parking and Other Revenue Streams	December 2010
Technical Memorandum #4 Determine the Impact of Parking Supply/Demand Management on Transit Use and Performance	December 2010
Interviews & Focus Groups with CBD Stakeholders	August 2010 – April 2011
Technical Memorandum #5 Determine the Impact of Parking Supply/Demand Management on Sustainable Land Use	March 2011
Technical Memorandum #6 Conduct Stakeholder Workshops and Presentations on Parking Supply/Demand Management	August 2011

Final Recommendations to Parking Management in Project CBDs

Executive Summary

Local officials often consider parking problems in downtown areas to be the result of inadequate, inconvenient or expensive parking. This perspective suggests that the best solution to parking problems is to increase parking supply without directly charging the end-user. While decision-makers and planners have long accepted that we cannot build our way out of congestion (see, e.g., Downs, 1992), we still believe we can solve the parking problem by adding more parking spaces, which is the equivalent of adding additional capacity on a congested roadway. This is especially true in the central business districts (CBDs) of Fort Lauderdale and Miami, which are transitioning from auto-centric destinations characterized by travel for a single purpose to urban downtowns with mixed land uses, including residential, and a new focus on planning for all modes of transportation. Although the level of traffic has decreased due to the recent economic downturn, traffic congestion remains a major long-term concern in the Miami and Fort Lauderdale CBDs. The Florida Department of Transportation (FDOT) and its partners have committed to significant infrastructure investments aimed at reducing congestion throughout the region, however, the diverse range of parking supply and demand management strategies have not yet been used to address congestion associated with parking in the Miami and Fort Lauderdale CBDs.

Parking supply and demand management strategies are increasingly seen as a solution to address many of the challenges to sustainability in the transportation system, including delay reduction, capacity utilization, transit performance and travel time reliability. These strategies are increasingly being considered as a part of broader community goals, including socioeconomic vitality, greenhouse gas reduction, community's "livability," funding for multimodal transportation investments, and economic development incentives. Yet, implementing parking supply and demand management strategies can be challenging. Abundant free parking is used throughout the U.S. to attract customers, visitors, and employees to a wide variety of destinations, The cities of Fort Lauderdale and Miami are no exception. It is not uncommon for businesses in areas with limited or priced parking (such as downtowns and CBDs) to feel that they are at a competitive disadvantage when compared to businesses that provide an abundant supply of unpriced parking (i.e., suburban malls). As a result, downtown businesses and constituents often favor policies that increase parking supply and reduce parking prices, in order to compete with suburban locations. Downtown businesses, however, ultimately bear the costs of unpriced parking, directly or through taxes, which they then pass on to the public.

This report builds on six technical memoranda to make recommendations regarding approaches for parking supply and demand management, and to evaluate their applicability to Miami and Fort Lauderdale. The first five memoranda focused on the topics of congestion management outcomes, Transportation System Management (TSM) and Transportation Demand Management (TDM), revenue streams, transit use and performance, and sustainable land use. The sixth technical memorandum summarized the opinions conveyed in stakeholder workshops and presentations. This report provides recommendations for Fort Lauderdale and Miami that are further developed in a more detailed implementation plan for each of the CBDs.

The purpose of this study is to assess the impact of parking supply and demand management on congestion, transit performance and sustainable land use in the CBDs of Miami and Fort Lauderdale. Several methods of research were employed to form a comprehensive analysis of parking in the study areas. Best practice literature was used to understand the existing research related to parking, and to prepare the first five memoranda. Topics include congestion management, transportation supply and demand management, revenue streams, transit, and sustainable land use. This information was supplemented with field studies to provide an understanding of current parking inventory and parking rates in the study areas. Comparisons are made to model cities, which are known for best practices related to parking supply and demand management, and peer cities, such as Boulder for Fort Lauderdale, and Phoenix, Washington, D.C., Atlanta and Detroit for Miami, which are comparable to the project CBDs. Researchers also conducted interviews with representatives of agencies and departments interested in the project CBDs.

The recommendations in this report represent a starting point for addressing both actual and perceived congestion issues in the Miami and Fort Lauderdale CBDs. Recommendations are organized into the following nine strategy types: pricing to manage demand; funding; land use planning; coordination of transportation and land use; coordinated parking policies for alternative modes of accessibility; regulation of parking providers; design and technology; improving public education through social marketing; and institutional coordination of parking, transportation and land use. While many of the proposed solutions require action on the part of local governments, the study reveals that there is a complex network of stakeholders that must be involved in addressing current and future needs related to mobility in the study areas, including developers, lenders, local and regional advisory boards, and transit providers,. The FDOT is well positioned to facilitate the dialogue started by this study, in an effort to ensure that these CBDs demonstrate state of the art practices in the field of parking management, transit use, and sustainable development.

Table of Contents

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

AAA: American Airlines Arena
BART: Bay Area Rapid Transit
BID: Business Improvement District
CAGID: Central Area General Improvement District
CBD: Central Business District
CBSM: Community-Based Social Marketing
CMP: Congestion Management Process
CMS/MMP: Congestion Management System/Mobility Management Program
DDA: Downtown Development Authority
DDOT: District Department of Transportation
DTM: Department of Transportation and Mobility
EPA: Environmental Protection Agency
FDOT: Florida Department of Transportation
FHWA: Federal Highway Administration
ITE: Institute of Transportation Engineers
ITS: Intelligent Transportation System
ISTEA: Intermodal Surface Transportation Efficiency Act
JTA: Jacksonville Transportation Authority
KCMT: King County Metro Transit
LADOT: Los Angeles Department of Transportation
LOS: Level of Service
LRTP: Long-Range Transportation Plan
MAPC: Metropolitan Area Planning Council
MPA: Miami Parking Authority
MPO: Metropolitan Planning Organization
MSA: Metropolitan Statistical Area
MTC: Metropolitan Transportation Commission
MUTCD: Manual on Uniform Traffic Control Devices
RFP: Request for Proposal
ROW: Right-of-Way
RTD: Regional Transportation District
SFCS: South Florida Commuter Services
SFMTA: San Francisco Municipal Transportation Agency
SIS: Strategic Intermodal System
TDM: Transportation Demand Management
TOC: Transit Oriented Corridor
TOD: Transit Oriented Development
TMA: Transit Management Association
TSM: Transportation System Management
TRB: Transportation Research Board
UA: Urbanized Area
ULDR: Unified Land Development Regulations
USDOT: United States Department of Transportation
VMS: Variable Message Signs
VTPI: Victoria Transport Policy Institute
WMATA: Washington Metropolitan Area Transit Authority

I. INTRODUCTION

Local officials often consider parking problems in downtowns to be the result of inadequate, inconvenient or expensive parking. This perspective suggests that the best solution to parking problems is to increase parking supply without directly charging the end-user. Decision-makers and planners have long accepted that we cannot build our way out of congestion (see, e.g., Downs, 1992). Paradoxically, there is a prevailing belief that parking concerns may be addressed by creating more parking spaces, which is the equivalent of adding additional capacity to an already congested roadway. Although the level of traffic has decreased due to the recent economic downturn, traffic congestion remains a major long-term concern in the Central Business Districts (CBDs) of Miami and Fort Lauderdale. The Florida Department of Transportation (FDOT) and its partners have committed to significant infrastructure investments aimed at reducing congestion throughout the region. However, the diverse range of parking supply and demand management strategies has not yet been used to address congestion associated with parking in the Miami and Fort Lauderdale CBDs.

Parking supply and demand management strategies provide solutions to many of the challenges facing a sustainable transportation system, including delay reduction, capacity utilization, travel time reliability, and transit performance. Many residents and community leaders in Miami and Fort Lauderdale envision their CBDs transitioning from the suburban downtowns prevalent in many South Florida communities, to more traditional urban downtowns. This transition will require a change from auto-centric destinations and developments to a focus on building communities with multiple modes of access, including vehicles, walking, bicycling, and transit. In order for this to occur, separated land uses that characterize suburban development will need to transition to transit accessible, mixed-use developments., and the trend of oversupply of parking in the CBD will need to transition to a parking supply that better satisfies demand.

Increasingly, parking supply and demand management strategies are considered as part of broader community goals, including socioeconomic vitality, community "livability," funding for multimodal transportation investments, environmental protection, and economic development incentives. Single-purpose downtowns continue to evolve into vibrant, multi-purpose districts, but the ability of most citizens to live, work and play their downtowns will require government entities to adopt more strategic approaches to transportation infrastructure that allow for the efficient movement of goods and people (Porter, 1995).

Implementing parking supply and demand management strategies, however, can be challenging. Abundant free parking is used throughout the U.S. to attract customers,

visitors and employees to a wide variety of destinations. The cities of Fort Lauderdale and Miami are no exception. It is not uncommon for businesses in areas with limited parking supply, or supply that is perceived to be overpriced (such as downtowns and CBDs), to feel that they are at a competitive disadvantage when compared to businesses that provide an abundant supply of unpriced parking (i.e., suburban malls). As a result, downtown businesses and constituents favor policies that increase parking supply and reduce parking prices to compete with suburban locations. Commercial enterprises located in downtowns, however, ultimately bear the costs of unpriced parking, directly or through taxes, which they then pass on to the public.

The pricing and management of parking has an influence on congestion management by impacting the practice of cruising for parking and affecting the cost of travel (Steiner, Jourdan, Blanco, Lisska, Mackey, Anderson, Hanley, Sucar & Rachmat, 2010a). Cruising for parking adversely impacts the transportation network in CBDs by increasing delays, reducing travel time reliability, and undermining transit reliability for bus services. Underpricing of parking affects travel costs due to its impact on the amount of travel, vehicle ownership, and the shift between modes of travel (Steiner *et al,* 2010a). If parking is too readily available or too inexpensively priced, there are fewer incentives for downtown visitors, customers, residents and employees to use transit, carpools and park-and-rides, or walk and bicycle. Thus, developing a comprehensive and coordinated parking supply and demand management strategy can be a challenge in a CBD that currently has an overabundance of parking. The users of a downtown are in a vicious cycle of parking dependence that is not unlike the vicious cycle of automobile dependence; the greater the availability of parking, the more likely people are to drive to a downtown and use the existing capacity there, which in turn leads to an increased demand for additional parking, and so on and so forth. This vicious cycle of parking dependence has the same negative consequences for community livability and economic viability as automobile dependence. Finally, vehicle ownership is inversely related to parking charges; as the price of parking increases, the rate of vehicle ownership decreases.

Excessive parking can constrain businesses and reduce economic vitality in other ways. The need to provide abundant free parking may prevent a business from expanding its building footprint or choosing a more optimal location. Providing free employee parking can reduce the supply available to customers or visitors. Efficient parking pricing and management, as well as other transportation demand management (TDM) strategies that result in more efficient use of parking supply, may be more profitable to businesses than practices based on abundant free parking. For example, when parking revenues are instead used to improve local streetscape conditions, or to fund transportation alternatives, it can result in increased business activity in a

downtown (Kolozsvari & Shoup, 2003).

The connection between land use and transportation is often not applied to parking, but the two clearly overlap. Many communities employ smart growth techniques and develop land use objectives that include higher density, mixed use, cluster development, urban infill and redevelopment, and more walkable streets to resolve historical patterns of unsustainable development. If parking supply and demand management is not incorporated into these land use strategies, however, the effectiveness of these types of projects can be undermined. For example, parking can interfere with walkability by increasing automobile traffic or encouraging urban design features, such as low-density land use patterns that deter walking and increase the cost of urban redevelopment. Increased availability of parking has also been shown to reduce housing affordability in the surrounding area (Franco, Cutter & DeWoody 2010).

The parking problems identified in this report reflect general concerns about the transportation system, including excessive parking supply, inefficient use of existing parking capacity, inconvenient parking pricing, insufficient user options, and inadequate information for travelers. Table 1 summarizes different perspectives regarding parking and the potential solutions to the problems discussed in this report. This list suggests the multitude of options available to address the parking problems in the Miami and Fort Lauderdale CBDs. This is not to suggest that there is a single correct perspective, problem or solution. It is helpful, however, to view the same problem from different perspectives in order to develop a set of solutions that address a diversity of experiences.

TABLE 1 - PARKING PERSPECTIVES AND SOLUTIONS

Perspective	Problem	Potential Solutions
Supply Oriented	Inadequate supply, excessive price.	Have governments, businesses and residents supply more parking. Increase minimum parking standards.
Information Oriented	Inadequate user information.	Create signs, brochures and other information resources indicating parking availability and price.
Choice Oriented	Inadequate consumer options.	Increase the range of parking convenience and price levels available to consumers.
Pricing Convenience	Pricing is inconvenient.	Develop more convenient payment and time options.
Efficiency Oriented	Inefficient use of existing parking capacity.	Share parking facilities. Implement transport and parking demand management. Price parking. Provide shuttle services to parking

		facilities.
Demand Oriented	Excessive automobile use.	Improve access and transport choice. Transport and parking demand management programs.
Spillover Impacts	Inadequate parking causes problems in other locations.	Use management strategies to respond to spillover problems. Improve enforcement of parking regulations.
External Impacts	Parking facilities impose external costs.	Reduce parking minimums. Price parking. Improve parking facility design. Implement TDM programs.

Source: VTPI, 2011c

Every vehicle trip into the CBD requires parking at its destination, so parking facilities are an integral component of the roadway system; they represent the terminal capacity where vehicles are placed when they are not in use. Parking is one of the first experiences people have when traveling to a CBD destination. Convenient and affordable parking is considered to be a sign of welcome and accommodation. Parking that is difficult to find frustrates users and can contribute to spillover effects – such as, cruising for parking or spillover parking in nearby areas. As a result, inadequate or poorly marked parking supply can create problems for both users and non-users.

Excessive parking, however, can also create problems. Parking facilities are capital intensive. The cost of building and maintaining them are imposed on developers, building users and governments, and all members of the community. Negative environmental impacts can also be associated with parking facilities, as they may contradict community development objectives for more livable and walkable communities. Abundantly available, un-priced parking tends to increase driving and discourage use of alternative modes of transportation.

Parking supply and demand management strategies represent a *paradigm shift* in the way parking problems are defined and how potential solutions are evaluated.

Old Paradigm: Motorists should be able to find easy, convenient, and free parking at every destination. Parking planning consists primarily of minimum parking requirements with costs borne indirectly through taxes and building rents.

New Paradigm: Parking facilities should be used efficiently so that such facilities often fill to capacity (i.e., more than once per week), provided that alternative options are available nearby and travelers have access to and information about these options (VTPI, 2010e).

The new paradigm means that parking pricing can be used to manage demand. The revenues generated from parking can be used to benefit the adjacent property owners. Public parking areas can have signs describing available parking options that give motorists a choice between paid parking nearby or free parking a few blocks away. The new paradigm also requires good walking conditions between parking facilities and the destinations they serve. As such, parking supply and demand management strategies should include shared parking, parking pricing, tax incentives, user information, and pedestrian improvements. This paradigm shift is explored throughout this report and culminates in a series of recommendations that are included in the implementation plan for each CBD.

The report is organized in five sections including this introduction, which has presented the rationale for parking supply and demand management strategies. Chapter II summarizes the methodologies used in this research, while Chapter III summarizes the conclusion of the first six memoranda in order to explain the existing conditions, policies, and practices affecting parking in the Miami and Fort Lauderdale CBDs. In order to achieve this objective, the existing parking inventory is first described and mapped, After which the policies of each CBD are described with respect to the use of congestion management, TDM and transportation system management (TSM) strategies, the use of parking pricing and the associated revenues, and the transit and TDM and transit strategies currently being used. Finally, Chapter IV describes and evaluates nine categories of parking supply and demand management strategies, including pricing to manage demand, funding, land use planning, coordination of transportation and land use, coordinated parking policies for alternative modes of accessibility, regulation of parking providers, design and technology, public education through social marketing, and institutional coordination of parking, transportation and land use.

II.   METHODOLOGY

This report brings together information and data gathered throughout a two-year process of data collection that is documented in six technical memoranda and in separate implementation plans for each of the downtowns.   The first five technical memoranda explored the literature and best practices related to parking supply/demand, including congestion management, TDM and TSM, parking management and revenue streams, transit use and performance, and sustainable land use practices.   These topics were developed from a combination of interviews and stakeholder workshops, technical advisory committee meetings (Table 2), literature review, and data collection and analysis.   The sixth memorandum summarized findings from interviews and stakeholder workshops on parking concerns and research findings up to that time.   See Project Schedule at the beginning of this document for a summary of the technical memoranda and the dates on which they were completed. This report takes the findings from the previous memoranda and incorporates them together to form a set of recommendations on parking policies at the state, regional and local levels in Miami and Fort Lauderdale.   The recommendations from this report are incorporated into an Implementation Plan for each CDB.

TABLE 2 – TECHNICAL ADVISORY MEETINGS

Meeting Date	Purpose
February 3, 2010	Kickoff Meeting/Conference Call
February 18, 2010	D4 Meeting
February 18, 2010	D6 Meeting
June 28, 2010	Discussion of Memorandum 1
August 26, 2010	Discussion of Memorandum 2
January 18, 2011	Discussion of Memoranda 3 and 4
April 26, 2011	Discussion of Memorandum 5
September 13, 2011	Discussion of Memorandum 6
December 13, 2011	Discussion of Recommendations for Miami CBD
January 9, 2012	Discussion of Recommendations for Fort Lauderdale CBD

For this project, the research team used the following methods of research: literature review, review of policy documents, field studies of parking inventory and parking rates, interviews with stakeholders, and technical advisory meetings and stakeholder workshops.   The literature review was used to prepare the first five memoranda, in order to better understand existing research as it relates to the relationships between parking supply and demand management and its impacts on the following topics: transportation system outcomes (e.g., congestion outcomes, cruising

for parking); parking revenues; transit; sustainable land use; best practices in parking supply and demand management strategies; and parking strategies used in peer cities and model cities. The research team reviewed documents regarding the current status of parking supply and demand management in the project CBDs (see Table 3 for a list of documents reviewed for this study). This information was then supplemented with field studies to provide a better understanding of current parking inventory and parking pricing in the project CBDs. Case studies, analysis of best practices, and analysis of current practices were also employed in the process of developing the technical memoranda. After a draft of each technical memorandum was completed, the Technical Advisory Committee (see list in Appendix A) reviewed and discussed it at meetings conducted by conference call. Additionally, the results of the first five technical memoranda were presented in a variety of stakeholder workshops, as well as meetings of transportation and land development organizations and other downtown interests. These analyses were supplemented by interviews with agencies and departments representing the project CBDs, including parking authorities, planning departments, downtown development authorities, transit agencies, and metropolitan planning organizations (MPOs) (see Table 4 for the list of visits to South Florida). A list of interviewees can be found in Appendix B.

TABLE 2 – LIST OF DOCUMENTS

Countywide Parking Policy Study for Miami-Dade County (1999)
Miami CBD Parking Analysis (2009)
Preliminary Financial Analysis: Broward County Judicial Complex (2009)
Broward County Transit Development Plan 2009-2018 (2008)
Broward County Transit FY 2011 Transit Development Plan Annual Update (2010)
Broward County Comprehensive Plan (2010)
Broward Metropolitan Planning Organization Identification & Evaluation of Congestion Management Strategies (1995)
2035 Broward Long-Range Transportation Plan (2009)
Fort Lauderdale: Building a Livable Downtown (2003)
Consolidation Downtown Master Plan for Fort Lauderdale: Building a Livable Downtown (2007)
City of Fort Lauderdale Comprehensive Plan Volumes 1 & 2 (2008)
Fort Lauderdale Code of Ordinances and Unified Land Development Regulations
Miami-Dade Comprehensive Development Master Plan (2010)
City of Miami Comprehensive Neighborhood Plan (2010)
Miami Comprehensive Neighborhood Plan EAR Process (2010)
City of Miami Comprehensive Plan (2004)

Miami 21 (2010)
Code of Ordinances, Miami, Florida (2010)
2008 Tri-Rail On-Board Survey Final Report (2009)
State Road 7 Rapid Bus: Phase 1 Implementation Plan (2005)
Multimodal Transportation Districts and Areawide Quality of Service Handbook (FDOT, 2002)
Downtown Fort Lauderdale Parking Study (2003)
Miami City Code of Ordinances, Transportation Control Measures (2010)
2025 Downtown Miami Master Plan (2009)
Transportation Enhancement Strategies for Downtown Miami (2009)
Downtown Miami Wayfinding and Signage Program (Draft) (2010)
Miami Parking Authority Annual Report (2008)
Miami-Dade County Transit, Transit Development Plan FY 2010-2019 (2009)
Miami-Dade MPO, 2035 Long-Range Transportation Plan (2009)
Tri-Rail Parking Management Study (2010)

TABLE 3 – VISITS TO STUDY AREA

Trip Date	Purpose
February 18, 2010	**Initial Meetings in Ft. Lauderdale and Miami**
May 3, 2010 – May 4, 2010	Data Collection/Interviews
August 8, 2010 – August 11, 2010	Data Collection
April 7, 2011 – April 8, 2011	Interviews/Present to Miami DDA Urban Design Committee
May 11, 2011 – May 12, 2011	Interviews
May 23, 2011	Interviews/Present to Fort Lauderdale TMA Board Meeting
June 16, 2011	Broward Workshop Urban Committee Meeting
July 5, 2011	Interviews in Miami and Ft. Lauderdale
July 14, 2011	Present to Broward MPO Board and Miami-Dade MPO TPC
July 21, 2011	Present to Miami-Date MPO Governing Board

September 7, 2011	Data Collection
September 21, 2011 – September 22, 2011	Interviews/Present to Miami-Dade MPOCTAC
October 19, 2011	Present to Miami PZAB
February 3, 2012	Meeting with D4 Transportation System Management and Operations (TSM&O) committee
April 12, 2012	Meeting with Miami Stakeholders at DDA
June 11-13, 2012	Interviews and Meeting with Miami Stakeholders at DDA

Another component of this research was the use of peer and model cities to provide benchmarks and examples for analyzing the success of strategies to manage parking supply and demand in areas comparable to the study areas. The peer cities were identified using the following methods: (1) public officials in Miami and Fort Lauderdale were consulted and asked who they identify as peer cities; and (2) the research team selected additional cities based on secondary sources, Census data and literature on the topic. Using these cities as a start, the research team considered specific variables at three different scales: (1) at the CBD level – population density, population, housing density, and employment density; (2) at the Urbanized Area (UA) level – total employment and employment density; and (3) at the Metropolitan Statistical Area (MSA) level – total population, total housing units, and total employment. If the cities were comparable to the project CBDs with respect to these variables, particularly at the CBD scale, these cities were considered peer cities. For example, Boulder, Colorado, is classified as a peer city of Fort Lauderdale, while Miami's peer cities are Phoenix, Washington, D.C., Atlanta and Detroit. On the other hand, if the cities were not initially comparable to the project CBDs with respect to these variables, those cities were considered model cities because of the parking supply and demand management strategies that are used in that particular city. As such, cities like San Francisco, Philadelphia, Boston, Chicago, San Diego, and Los Angeles are classified as model cities for the project CBDs because of their parking-related practices. A detailed analysis of the peer and model cities can be found in Appendix C.

Based upon the information gathered in the first six technical memoranda, a list of strategies related to parking supply and demand management, and current parking issues in the project CBDs, was developed. Through an iterative process, each strategy was examined for its strengths and weaknesses, and its relevance to project goals. Ultimately, a final list of nine categories of strategies was developed. These nine

categories of strategies concern: pricing to manage demand; funding; coordination of parking and land use; coordinated parking policies for alternative modes of accessibility; regulation of parking providers; design and technology; improving public education through social marketing; and institutional coordination of parking, transportation and land use. Many of these categories contain sub-strategies that more specifically address parking management practices and concerns. These strategies provide a structure for understanding the recommendations put forth in this report.

For each strategy and sub-strategy, a process was developed to describe and evaluate its merit for application in Miami and/or Fort Lauderdale. In order to make this evaluation, the following steps were taken: First a set of evaluation criteria, which is described in greater detail below, was developed. These evaluation criteria were developed from the literature review and previous research in which the principal investigator participated while on sabbatical at the University of Washington (see Hallenbeck, Moudon, de Montigny, Carlson, Ganey & Steiner, 2007). Then, each of the 22 strategies was developed based upon theoretical and conceptual research. Next, examples of each strategy were analyzed, primarily focusing on a list of peer and model cities generated from technical memoranda and information obtained from interviewees. These strategies provide a basis for best practices in each strategy area. After studying examples of best practices, the current application of the various strategies related to parking supply and demand management in each CBD was analyzed.

After each of the strategies was developed, it was evaluated against the evaluation criteria. The first criteria explores how the proposed parking supply and demand management strategy can decrease the demand for automobile trips for the user, meaning it explores "the degree to which an approach decreases the number of personal vehicle trips that travelers make" (Hallenbeck, et al.2007: C-17). This criterion includes a decrease in total trip demand, as well as a shift from vehicle based travel to other modes of transportation such as mass transit, ride-share, bicycle or pedestrian travel. The second evaluation criterion considers how the strategy could increase the supply of alternative modes of transportation. This criterion refers to "the degree to which an approach successfully encourages the deployment and use of well-functioning transportation facilities that serve multiple modes of travel" such as "mass transit facilities and service, ride-share programs, and pedestrian and bicycle infrastructure" (Hallenbeck et al., 2007, C-11).The third evaluation criterion explores the cost efficiency of the strategy (i.e., economic efficiency, social costs & benefits), meaning it examines the degree to which the benefits and costs of the strategy are balanced. The objective of cost efficiency is to maximize social benefits and minimize social costs, with these costs and benefits being defined in the economic sense, and including positive and negative, and tangible and intangible, externalities (i.e., costs or benefits that are not

priced).   In this criterion, evaluation of the "degree to which an approach can be used to generate public funds" is discussed (Hallenbeck et al., 2007: C-18).   Ideally, these public funds should be reinvested in parking or transportation.   Here, costs and revenues are defined in the financial sense and only pertain to the agency in charge of the strategy.   Finally, the political acceptability and legality of the strategy is discussed to understand "the degree to which an approach is acceptable to various political constituencies" (Hallenbeck et al., 2007: C-06).   Legality is defined as the degree to which a strategy could "withstand legal challenges from the private sector, the community or other jurisdictions" (Hallenbeck *et al.*, 2007: C-13).   The specific criteria with their guiding questions can be found in Appendix D.

After each of the strategies was evaluated against these five broad criteria, the degree of implementation of each strategy was ranked as high, medium or low. Strategies that are not being implemented may have a higher priority in terms of public policy than strategies that have a high degree of implementation, since the latter may only need reinforcement and control.   An initial indication of the overall 'desirability' and priority of each strategy for implementation is presented as a means to summarize the evaluation criteria and the degree of implementation.   Finally, recommendations are made for each strategy based on the description, best practices, current applications and evaluation. The recommendations acknowledge the varying range and feasibility for each strategy, and how they might fit in with current policies and practices and the many levels of government involved. These recommendations were presented to local decision-makers in Ft. Lauderdale and Miami to develop an implementation plan for each CBD.

In the next section, the existing conditions in each of the CBDs including the existing parking supply, congestion management and TSM, and pricing and revenues, transit and TDM. These overviews provide background to support the following section, which presents the results of the analysis.

11

III. ANALYSIS OF CURRENT PARKING SUPPLY AND DOWNTOWN POLICIES AFFECTING PARKING

EXISTING PARKING INVENTORY

The Miami Downtown Development Authority (DDA) "is an agency charged with making Downtown Miami the most livable urban center in the nation and strengthening its position as the international center for commerce, culture, and tourism" (Miami DDA, 2009). According to the Miami DDA, the CBD is bounded by NE 5th Street to the north, the Miami River to the south, Biscayne Boulevard and Bayfront Park to the east, and SE First Avenue to the west. The DDA Master Plan expresses the desire to expand the CBD to the north to NE 9th Street (Miami DDA, 2009). This aspiration has served as a guide in determining the CBD boundaries for this study; therefore, the expanded Miami CBD, with the northernmost extension to NE 9th Street, served as the boundary for the study area. The boundaries of the Miami Community Redevelopment Agency (CRA) overlap with the northern part of the CBD and extend to the north beyond the DDA boundaries. Approximately 27,500 parking spaces are available for public use within the CBD boundaries.   Public use parking is publically or privately managed parking infrastructure that can be used by any member of the public, and therefore excludes employee- or patron-only parking. The complete CBD study area boundary, including parking inventory, can be seen in Figure 1. Also see Appendix E for parking inventory tables.

The Fort Lauderdale DDA was established in 1965 by a Special Act of the Florida State Legislature, and is an economic development agency tasked with the rehabilitation of slum and blighted areas in the downtown area (DDA Fort Lauderdale, 2009a). The Fort Lauderdale DDA jurisdiction encompasses an area of about 0.6 square miles, or just under 400 acres. Many regional venues and attractions, like the Broward County Courthouse and the Riverfront District, are located in the DDA jurisdictional boundary.

Following recommendations from staff members of various Broward County and city transportation entities, the Fort Lauderdale DDA area was deemed the ideal geographic boundary for the Fort Lauderdale study area. This DDA area, which is identical to the CBD area, is bounded by NE 6th Street to the north, the New River to the southwest, SE 7th Street to the southeast, NE/SE 5th Terrace to the east; and roughly – from north to south – NW 2nd Avenue, SW 7th Avenue, and SW 2nd Avenue to the west. Within the DDA/CBD boundaries, approximately 17,000 parking spaces are available for public use.   The DDA/CBD study area and is pictured with parking inventory in Figure 2. Also see Appendix E for parking inventory tables.

FIGURE 1 - PARKING INVENTORY FOR MIAMI

Miami CBD Parking Inventory
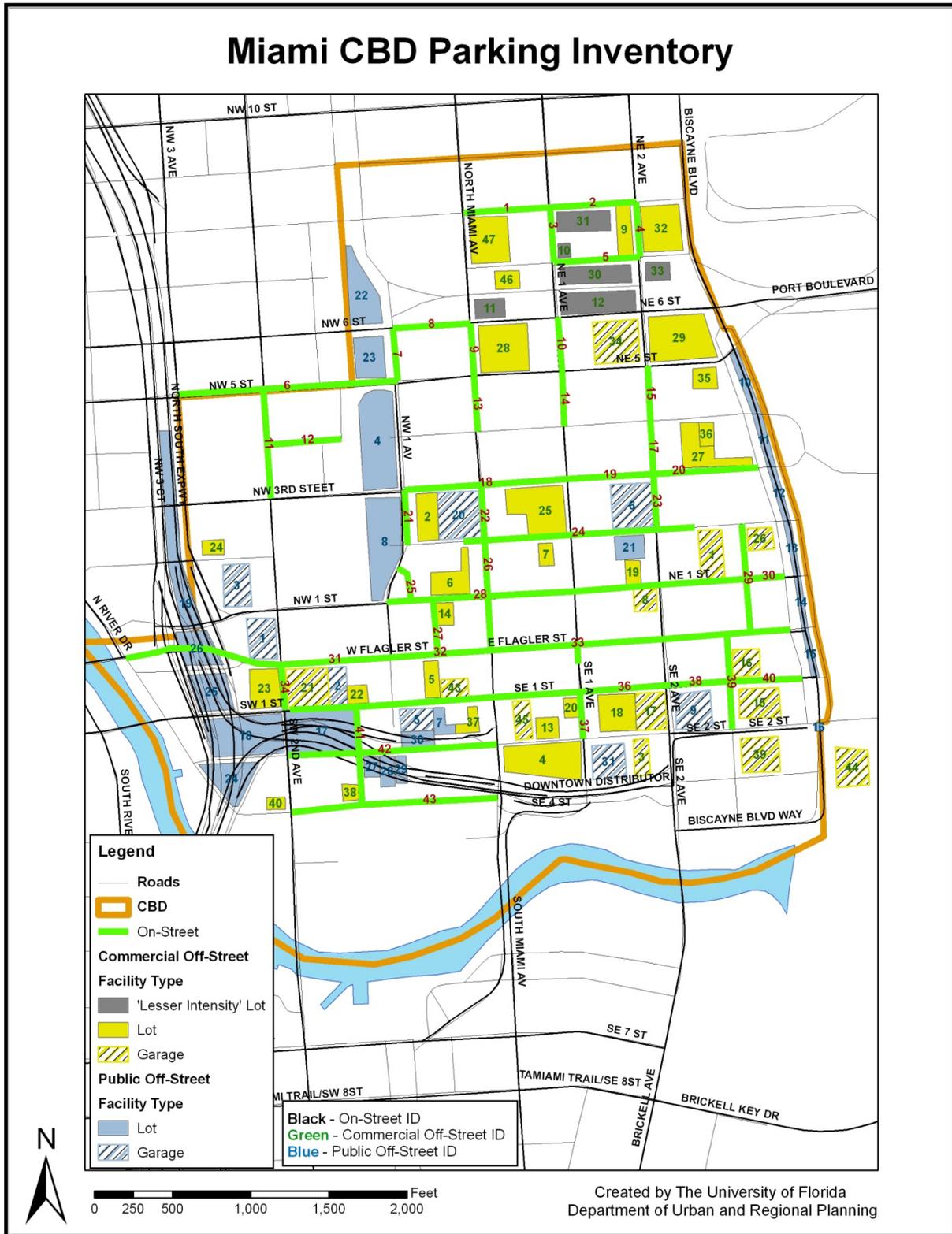
Source: University of Florida Urban and Regional Planning, 2011

FIGURE 2 - PARKING INVENTORY FOR FORT LAUDERDALE
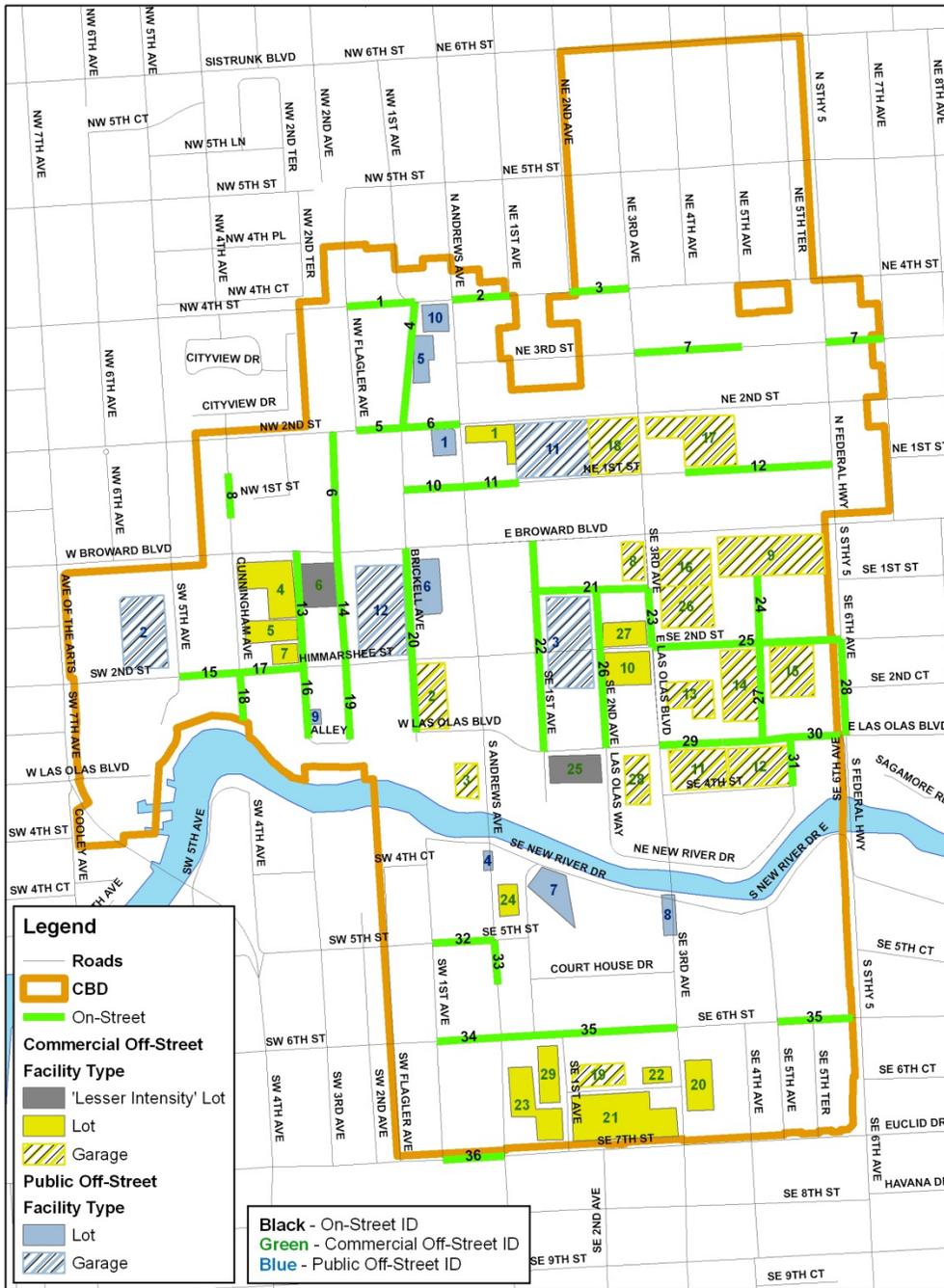
Source: University of Florida Urban and Regional Planning, 2011

CONGESTION MANAGEMENT AND TSM

Miami-Dade County developed a Congestion Management System (CMS) and Mobility Management Program (MMP) in 1996 following requirements set by the Federal Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 (Kimley-Horn and Associates, Inc., 2004, p. 2). Specific CMS goals identified for the county included improving the mobility of people and goods, improving the efficiency of the transportation system, and ensuring that congestion management becomes fundamental to the land use and transportation planning processes (Barton-Aschman, 1999). The Miami-Dade County CMS has considered and/or implemented a number of strategies for achieving these goals. These strategies include TDM, high occupancy vehicle lanes, transit operations improvements, congestion pricing, traffic operations improvements, access management, bicycle and pedestrian facilities, incident management, general use lanes, enhanced transit, and intelligent corridor systems (Barton-Aschman, 1999, p. 1-2).

In 2009, the Miami-Dade CMS was expanded in scope, and is currently known as the Congestion Management Process (CMP). The CMP differs from the CMS due to the addition of "Development of Congestion Management Objectives" (Gannett Fleming, 2010). The CMP has three primary objectives: 1) providing short-term congestion mitigation, 2) maintenance and operations improvements, and 3) maximizing the efficiency of the current system (Gannett Fleming, 2010, p. 14). Current parking policies in Miami-Dade may not match well with other congestion strategies because "the existing parking strategies include low-cost, abundant parking in the CBD," (D. Rivera, personal communication, April 20, 2010). A 2011 survey confirmed that daily and hourly parking rates in Miami are below the national average (Moore, 2011). A large supply of low-cost parking undermines congestion mitigation objectives, such as increased vehicle occupancy and transit use (D. Rivera, personal communication, April 20, 2010). These statements are supported by the literature review in the preceding technical memoranda.

The Broward County MPO has had a CMS in place since 1995; however, the plan is out of date. The Broward Long-Range Transportation Plan (LRTP) 2035, recommends that the 1995 CMP plan be updated to include the new congestion mitigation initiatives described in the 2035 LRTP (Broward MPO, 2009, p. 78). The congestion-mitigation strategies in the 2035 Broward County LRTP include shifting mode choice from the automobile to other forms of transportation, enhancing operations on existing roadway facilities, decreasing trip length, and decreasing the need for trip making (Broward MPO, 2009, p. 79-80).

The Broward County MPO performed an extensive analysis of the county's transportation needs when forming the LRTP. Among the challenges identified in the LRTP plan is the recognition that the regional roadway network is nearly built-out, but travel demand continues to rise. The county does not have the space needed to expand roadways and provide additional parking (Broward MPO, 2009, p. 18). A second challenge is the integration of land use and transportation objectives (Broward MPO, 2009, p. 25). The Broward County MPO specifically identifies minimum parking requirements as a detriment and urges local governments to decrease parking requirements (Broward MPO, 2009, p. 98).

Broward County MPO is using mobility hubs as one strategy to create a shift in user mode choice (Broward MPO, 2009, p. 26). Mobility hubs are designed to accommodate multiple high capacity lanes in downtowns and near major activity centers, such as employment centers, town centers, and regional shopping centers (Broward MPO, 2009, p. 27-28). The use of mobility hubs accentuates the need to address the supply, demand, location and minimum code requirements for parking. The 2035 LRTP also recommends the use of car sharing and bike sharing programs in conjunction with mobility hubs. The combined use of strategies will increase the overall accessibility to transit, subsequently increasing transit use and reducing the necessity for car ownership (Broward MPO, 2009, p. 49).

The Broward LRTP classifies its transit initiatives using two categories: 1) premium high-capacity transit service, and 2) premium rapid bus. Premium high-capacity transit service includes light rail, commuter rail, streetcars, and people mover technologies (Broward MPO, 2009, p. 29). Both premium services receive signal priority and operate in distinctive vehicles in mixed traffic. The most distinctive operating characteristics of premium rapid bus are the superior transit and headway times that are offered. The Fort Lauderdale Comprehensive Plan contains policies for developing congestion management strategies (E. Parker, personal communication, July 7, 2010). Policy 1.3.5 calls for the periodic evaluation of the roadway network and formulation of "low cost solutions," such as restricting left turns and reversing traffic lanes (Fort Lauderdale, 2008, p. 9-7).

PRICING AND REVENUES

The Miami Parking Authority (MPA) was established in 1955 and is known as the City of Miami's Department of Off-Street Parking (MPA, 2011a). The objective of the MPA is to provide "convenient, affordable short-term and long-term parking; promote economic use of urban land with responsible development; and complements public transportation initiatives" (MPA, 2011a). The MPA parking rate structure is set by city ordinance with the current rates established in December 2009 (MPA, 2011a). Rates

are periodically reviewed by the city (MPA, 2011a). Off-street hourly rates range from $4.00 to $8.00, off-street daily rates range from $6.00 to $20.00, and off-street monthly rates range from $90.00 to $155.00 (Bier Associates Parking Consultants, 2009).

Total revenues for the MPA for fiscal year (FY) 2008/2009 were almost $23 million. The difference between revenues and expenditures (e.g., net revenue) is allocated to the city's general fund while the 'break-even' portion remains with the MPA (A. Noriega, personal communication, October 27, 2010). The main source of revenue is on-street parking, followed by off-street parking facilities. The expenditures are less than $22 million, making the operation self-sustainable.

The net revenue for the MPA was $1,140,054 in FY 2008/2009. With a projected population of 390,191 for the city, the net revenue per-capita is $2.92 (City of Miami, n. d.). As a comparison, Shoup (2006) states that cities in the U.S. collected an average of $1.43 per capita in net parking revenues in 1997 (or $1.91 in 2009 dollars) (p. 321). The City of Miami, therefore, collected 52.87 percent *more* than the average city in the U.S. (assuming collection increased at the inflation rate).

The Fort Lauderdale Department of Transportation and Mobility (DTM) is an organization that oversees aviation, transportation, and parking in the city. An Enterprise Fund finances aviation and parking while the city's General Fund subsidizes transportation (D. Alarcon, personal communication, December 14, 2011). The total revenues for the DTM, as related to parking (budget items related to the vehicle rental system are not shown), were almost $12 million for FY 2008/2009.

The DTM's main source of revenue is charges for on-street and off-street parking, followed by fines. All of the revenues, including fines, go directly to the DTM, not the general fund. For each citation that is written, however, $5 is donated to a Crossing Guard Program (D. Alarcon, personal communication, June 3, 2010). The annual expenditures of the DTM are $8.5 million, making the operation self-sustainable. The main expenditures are salaries and operating expenses. The annual net revenue (revenue minus expenditures) averages from $1 million to $1.2 million (D. Alarcon, personal communication, December 14, 2011). With a projected population of 180,000, the net revenue per-capita for parking in Fort Lauderdale is $18.65.

Both project CBDs have publicly-owned parking spaces. The MPA allows private lot operators to set the market rates and uses those rates to set the parking prices for the MPA. Kimley-Horn and Associates, Inc. (2000) analyzed the parking rates charged by the City of Fort Lauderdale, local competitors, and other county facilities. The study indicated that the city-maintained parking rates in downtown Fort Lauderdale were

underpriced compared to other parking providers in the area. Walker Parking Consultants found that the "major parking demand generator in the immediate area is the Judicial Center. The Judicial Center also controls the most desirable parking in the area; therefore, the County establishes the market parking rate for transient parking" (Broward County, 2009).

TDM AND TRANSIT

Miami and Fort Lauderdale employ several TDM and transit strategies locally and regionally to mitigate congestion. TDM is a broad concept that addresses optimization of transportation system performance by enhancing accessibility, predictability/travel time reliability, information, choice, and overall transportation system performance (FHWA, 2010c). Depending on the locality and scale, different agencies are responsible for different strategies within their jurisdiction. Although the scope of this project focuses on congestion in the project CBDs, congestion in the CBDs is linked to the regional transportation system in South Florida.

The Miami and Fort Lauderdale CBDs are served by several types of transit. In the Miami CBD, transit is operated by Miami-Dade Transit (MDT) and includes Metrobus, Metrorail, and Metromover. MDT operates most public transit service in Miami-Dade County. MDT also operates two express routes on Interstate 95 (I-95) that connect the Miami CBD to the Sheridan Street and Broward Boulevard park-and-ride stations. Transfers to MDT are possible from the South Florida Regional Transportation Authority Tri-Rail service and the Broward County Transit (BCT) bus services.

The Fort Lauderdale CBD is served by several BCT bus routes, the FL-1 Tri-Rail shuttle, and three Sun Trolley routes. The Tri-Rail shuttle provides free connections from the Fort Lauderdale Tri-Rail station (located at I-95, near Broward Boulevard) to the Fort Lauderdale CBD. BCT also operates two I-95 express routes that connect the Miami CBD to the Miramar Town Center and Hollywood/Pines Boulevard park-and-ride facilities. Additionally, the Fort Lauderdale DDA, in cooperation with other government agencies, is planning and developing the Wave Streetcar System, which is a downtown circulator that will allow travelers to move around the CBD without the need for an automobile (DDA Fort Lauderdale, 2009b).

Miami was one of six cities awarded funding from the United States Department of Transportation (USDOT) through the Urban Partnership Agreement/Congestion Reduction Demonstration (UPA/CRD) Program in 2008. The program is intended to alleviate traffic congestion on the I-95 corridor between I-595 and I-395 through TDM and TSM strategies like High Occupancy Toll (HOT) lanes and enhanced transit. This

project is being implemented by FDOT and is supported by Florida's Turnpike Enterprise, MDT, BCT, and South Florida Commuter Services (SFCS) (NBRTI & CUTR, 2010).

In Phase IB of the project, three new bus routes known as "95 Express Bus Service" were added (NBRTI & CUTR, 2010). The express routes stop at park-and-ride locations throughout central Broward County and operate similar to bus rapid transit, with routes having limited stops, by traveling via HOT lanes on I-95.

The Miami-Dade MPO operates the South Florida Vanpool Program, with support from the Broward and Palm Beach County MPOs. Currently, there are 206 vanpools in the region, with outreach efforts focused on federal and private sector employees located in Downtown Miami. Efforts to promote vanpools in the Downtown Fort Lauderdale area are also underway, as Fort Lauderdale has a need for alternative modes of transportation due to the lack of direct rail access (J. Guerra, personal communication, August 23, 2010).

The Broward County MPO recommends the use of Intelligent Transportation Systems (ITS), Arterial Dynamic Message Screens (ADMS), and travel time systems to address congestion mitigation (Broward MPO, 2009, p. 34). ADMS technology consists of message screens on major roadways that report accident and other pertinent emergency information that could avert congestion (Broward MPO, 2009, p. 35). Travel time systems provide travelers with real-time data about traffic movement and transit service information (Broward MPO, 2009, p. 35). Improved traveler information and communication technology services would give travelers the ability to make educated decisions about routes and modes in which they travel. Dynamic messaging systems could have positive impacts on congestion (Broward MPO, 2009).

Miami and Fort Lauderdale both utilize the same pay-by-phone technology in their CBD parking facilities. Both cities use Verrus Mobile Technologies as the provider for their pay-by-phone programs, meaning users only need one account for both cities, which improves convenience and the overall travel experience in South Florida (Verrus Mobile Technologies, 2010b). Additionally, A Park Smart universal card can be used in all machines. Online websites are also an effective means of providing information to travelers prior to their arrival in the CBDs, and Fort Lauderdale's DTM, as well as the MPA, have websites that contain information on parking facility locations, rates, and payment options. The MPA has shown interest in eliminating all physical meters in certain areas which could be facilitated by advanced technologies (A. Noriega, personal communication, May 3, 2010).

IV. ANALYSIS OF STRATEGIES

This chapter describes each of the 22 best practice strategies related to parking supply and demand management. Each strategy is described based upon the literature on best practices in parking management, examples of its application in the project CBDS and other cities. Then each strategy is evaluated against the five evaluation criteria – decrease demand for car trips, increase supply of alternative modes of transportation, cost efficiency, revenue generation, and political acceptability and legality. Finally recommendations are made regarding the priority of these strategies for implementation in each CBD. These strategies represent a subset the broader set of recommendations for the project CBDs included in the first five technical memoranda. Tables 5 and 6 summarize the evaluation and assessment of each strategy.

A. PRICING TO MANAGE DEMAND

Competent economic principles dictate that, at the very least, parking should be priced for the purpose of recovering expenditure costs. Both Fort Lauderdale's DTM and the MPA currently price parking to achieve this goal (Steiner, Blanco, Jourdan, Hanley, Mackey, Lisska, Shmaltsuyev & Sucar, 2010c). The use of demand-based pricing is an alternative method for setting parking rates. Rates are determined based upon the demand for parking, rather than the goal of recovering expenditure costs. This section is a review of pricing strategies that describe best practice methods for demand-based rate schemes for municipal parking providers.

Parking pricing has two major benefits: 1) recovering the cost of implementing and maintain parking services and 2) using pricing mechanisms to manage the demand for parking. This section discusses pricing strategies that revolve around the goal of manipulating the demand for parking. The first strategy uses variable pricing to achieve 85 percent occupancy for on-street facilities, and the second strategy uses variable pricing to achieve differential demand. In this section, these two variations in technique are described separately but evaluated as one.

Variable Pricing to Achieve 85% Occupancy for On-Street Parking

Description

According to Shoup (2005), "research at six sites showed that an average of 30 percent of the cars in congested traffic were cruising for parking" (p. 14). Cruising for parking refers to the motorist's practice of circulating an area in search of an open parking space that is considered to be an appropriate price and/or within an acceptable distance from their destination. Cruising for parking occurs when prices for on-street

TABLE 4 - EVALUATION OF RECOMMENDATIONS

BEST PRACTICE STRATEGIES		MEMORANDUM					STRATEGY GOALS				
		1	2	3	4	5	Decrease Demand for Car Trips	Increase Supply of Alternative Modes of Transportation	Cost Efficiency	Revenue Generation	Political Acceptibility and Legality
1	Pricing to Manage Demand		X	X			***	*	**	***	**
2	Benefit Districts		X	X			**	***	***	*	***
3	Increase Fines			X			***	*	***	**	***
4	Parking Reductions					X	**	***	***	*	***
5	Parking Maximums					X	**	*	***	*	*
6	Unbundle Parking		X			X	*	*	***	*	***
7	Parking Exemptions						**	*	***	**	**
8	Promotion of TOD				X	X	***	***	**	***	***
9	Incentives for Smart Growth						***	*	*	*	*
10	Negotiation of Parking Requirement						**	*	**	*	***
11	Mass Transit Servies		X		X		***	***	*	*	***
12	Park and Ride					X	**	**	**	*	**
13	Car-Sharing				X		***	***	***	*	***
14	Bicycle Facilities Planning		X		X		***	***	**	*	***
15	Commuter Incentives				X		**	***	***	*	**
16	Taxes to Commerical Parking		X	X			***	*	***	***	*
17	Rate Regulation/Collection of Taxes and Fees		X	X			**	*	**	***	*
18	Signage and Wayfinding						***	*	**	*	***
19	Electronic Systems		X	X			*	*	***	***	***
20	Sensors, Real-Time Data and Pricing Applications	X	X				**	*	***	***	***
21	Improving Public Education Through Marketing		X				***	*	**	*	**
22	Institutional Coordination					X	**	***	**	*	***

Numbers do not indicate strategy rank but rather a point of reference to compare the same strategies on Table 6 and 7. **Legend:** X - Yes   * - Low   ** - Medium   *** - High

TABLE 5 - ASSESSMENT OF IMPLEMENTATION PRIORITIES

	BEST PRACTICE STRATEGIES	DEGREE OF IMPLEMENTATION		RECOMMENDATIONS				IMPLEMENTATING AGENCIES	
		Miami	Fort Lauderdale	Overall Desirability for Miami	Priority for Implementation for Miami	Overall Desirability for Fort Lauderdale	Priority for Implementation for Fort Lauderdale	Miami	Fort Lauderdale
1	Pricing to Manage Demand	**	**	**	**	**	**	MPA	Parking and Fleet Services
2	Benefit Districts	*	*	***	***	**	***	MPA, Neighborhood Associations	Parking and Fleet Services, Neighborhood Associations
3	Increase Fines	*	**	***	***	***	**	Miami-Dade County, MPA	Broward County, City of Fort Lauderdale Parking and Fleet Servicees
4	Parking Reductions		***	***	*	***	*	City	City
5	Parking Maximums	*	*	***	***	**	**	City of Miami	City of Fort Lauderdale
6	Unbundle Parking	*	*	***	***	***	***	City of Miami	City of Fort Lauderdale
7	Parking Exemptions	*	***	***	***	***	*	Planning and Zoning	Planning and Zoning
8	Promotion of TOD	**	*	***	***	***	***	FDOT, County, City, MDT	FDOT, County, City, BCT, TMA
9	Incentives for Smart Growth	**	**	***	**	***	**	Planning and Zoning	Planning and Zoning
10	Negotiation of Parking Requirement	*	**	**	**	*	*	Planning and Zoning	Planning and Zoning
11	Mass Transit Servies	***	**	***	**	***	**	MDT, SFRTA, FDOT, City	BCT, SFRTA, FDOT, City
12	Park and Ride	**	**	***	***	***	***	All planning and transportation Agencies	All planning and transportation Agencies
13	Car-Sharing	*	*	***	***	***	***	SFCS, City Planning	SFCS, City Planning
14	Bicycle Facilities Planning	*	*	***	***	***	***	City; FDOT/County/City for bike lanes	City; FDOT/County/City for bike lanes
15	Commuter Incentives	**	**	**	**	**	**	FDOT, SFCS, SFRTA, MDT	FDOT, SFCS, SFRTA, BCT
16	Taxes to Commerical Parking	***	*	***	*	***	***	Planning and Zoning, Commission	Planning and Zoning, Commission
17	Rate Regulation/Collection of Taxes and Fees	**	**	***	***	***	***	City	City
18	Signage and Wayfinding	**	*	***	*	***	***	FDOT, City Planning, DDA	FDOT, City Planning
19	Electronic Systems	*	*	***	*	***	*	Planning Dept, DDA, MPA	Planning Dept, DDA, Parking and Fleet Services
20	Sensors, Real-Time Data and Pricing Applications	*	*	**	*	**	*	FDOT, City Planning	FDOT, City Planning
21	Improving Public Education Through Marketing	**	*	**	**	***	***	FDOT, DDA, MDT, MPA, Businesses and Venues in the CBD	FDOT, BCT, DDA, Parking and Fleet Services, Businesses and Venues in the CBD
22	Institutional Coordination	**	**	***	***	***	***	All Agencies	All Agencies

Legend

X - Yes   * - Low   ** - Medium   *** - High

parking are considerably lower than the prices of off-street parking. In Figure 3, each point represents the combination of the price of on-street parking and the price of the nearest off-street parking. Since all points are above the line of equality (45 degree line from origin), there is an incentive for motorists to cruise for parking. The objective of properly-priced, on-street parking is to create a convenient supply of short-term parking and eliminate incentives for cruising. Convenient parking is not the same as free parking, which tends to generate overutilization and a lack of parking availability.

Litman (2006a) states that on-street parking facilities, when compared to off-street facilities, are more visible and more easily serve multiple destinations, which is the reason they tend to have the highest demand. Despite the high demand, on-street parking should not be priced for cost recovery. Button (as cited in Shoup, 2005, p. 555) claims that there are two approaches to charging for parking spaces: administrative and economic. The administrative method is "concerned with cost recovery and is closely entwined with the highway engineer approach to urban traffic problems." The economic method is to "regulate charges in sympathy with the prevailing state of demand in the same way that other commodity prices vary" (Shoup, 2005, p. 555).

FIGURE 3 - COMBINATION OF ON-STREET AND NEARBY OFF-STREET PARKING PRICES

Source: Shoup, 2005, p. 327

23

On-street parking has lower administrative costs, but higher opportunity costs because it occupies right-of-way (ROW) and public space. A mechanism is needed to ration demand; for that objective, the economic approach of pricing parking to manage demand is the best strategy. The cost recovery price for CBD on-street parking is $301 per month ($15.67 per day) in 2002 dollars (including the opportunity cost of the land), or $365.27 per month ($18.29 per day) in 2010 dollars (Litman, 2007). With this strategy, the goal is to vary parking pricing in order to achieve a certain demand, while simultaneously considering the cost of providing that parking. An 85 percent occupancy rate can be achieved through this variable pricing method, which is equivalent to about one vacant space per average block. "Traffic engineers recommend that about 15 percent of curb spaces - one space in every seven - should remain vacant to ensure easy ingress and egress. This cushion of vacant spaces eliminates the need to cruise, and a few spaces will generally be vacant within a block or two from any point" (Shoup, 2005, p. 297).

Parking pricing strategies include basic fee manipulation in order to shift temporal (time) or spatial (location) demand. Fee increases and decreases can be set to respond to market forces or government regulation. As well, short versus long-term fee differentials can be used to attract short-term parkers or non-commute parkers, while deterring long-term, commuter parkers. By changing rates according to the time of day or the location, on-street parking fees can also help to subsidize on-street parking (TRB, 2005, p. 2-3).

The success of the variable pricing strategy depends upon the responsiveness of the demand to price (elasticity). Market mechanisms are the basis for the idea of pricing parking. The degree to which this strategy can generate revenue depends upon the responsiveness of the demand for parking to the price of parking. In general, it is assumed that "parking demand, as measured strictly by the number of cars parking, is inelastic with respect to price" when looking specifically at work-based trips (TRB, 2005, p. 4). As a result, increases in parking fees are generally met with an increase in total revenue (TRB, 2005, p. 5). "Prices cannot constantly fluctuate to maintain an occupancy rate of exactly 85 percent… but they can vary frequently enough to avoid chronic overcrowding or underuse. If about 15 percent of spaces are vacant, then the price is right" (Shoup, 2005, p. 299). Since correct pricing can prevent cruising for parking, Shoup has dubbed this strategy "turning wasted time into public revenue" (Shoup, 2005, p. 369). Changing prices is standard practice for commercial providers.

According to Shoup (2005), pricing on-street parking has multiple benefits. First, it creates a rent for the private use of public land. Unlike off-street lots, on-street spaces

lie within the public ROW. Second, on-street parking can be accurately priced and cheaply measured. Unlike off-street parking, there are no socially disbursed costs for the use of on-street parking. Motorists are paying directly for the service they are using, and only car-users will pay. This allows low-income citizens, who don't own cars, to be free from paying like everyone else. Litman (2006) found that the poorest quintile of households in the United States owned only one-sixth of the number of cars, per household, that the richest quintile owned. As a result of their higher rate of car ownership, high-income households are more likely than low-income households to bear the cost of pricing parking.

Plans to increase parking rates are typically met with resistance. For this reason, Shoup (2005) suggests that the goal of parking policies be redefined in the public arena. By redefining the goal of parking policies, public discussion of parking can shift from one concerned with price, to one concerned with defining a target occupancy rate. Due to this change in perspective, "the city council can dodge the responsibility for individual meter rates. Impersonal market forces, rather than individual council members' votes, will determine the right price of curb parking. The target occupancy is the goal, and the price of curb parking is the means to achieve this goal" (Shoup, 2005, p. 305).

A Transit Cooperative Research Program report (TRB, 2005) suggests that a fee increase of $1-2 daily reduced long-term parking accumulation by 20-50 percent, with much of the impact being attributable to shifts in parking location to places with lower demand for parking. In San Francisco, shopper's reduced parking duration when faced with fee increases, and commuters tended to stop using those facilities entirely (TRB, 2005). Similarly, Shoup (2005) reports an experiment in central areas of London in which the average time for parking and visiting decreased by 66 percent after prices for on-street parking were quadrupled.

Current Application in Project CBDs

The hourly rate for on-street parking in the Miami CBD is $1.50 per hour, which compares favorably with on-street parking rates for other cities in the U.S. In the year 2000, the hourly rates in select U.S. cities ranged from $0.60 in Phoenix to $1.50 in Los Angeles, which means that Miami's hourly rate for on-street parking is in the upper range among its peers. At the median hourly rate, the daily cost recovery amount ($18.29) is achieved in 14.6 hours of parking. This figure is considerably lower than the hourly rate for off-street parking and could encourage cruising for on-street parking. Taking into account that most of the MPA's revenue comes from on-street parking, rates for on-street can and should be increased.

The hourly rate for on-street parking in the Fort Lauderdale CBD varies between $0.50 and $1.50, with a median rate of $1.25. This also compares favorably with rates for other cities in the U.S., and explains why on-street parking presents an average monthly collection per space of $329.05, compared to the average for off-street parking of $61.87. Fort Lauderdale, however, is not currently employing variable pricing strategies to achieve 85 percent occupancy. If the city decides to increase off-street prices to reach cost-recovery levels, on-street levels should also be changed to avoid incentives for cruising.

Variable Pricing According to Differential Demand

Description

This strategy, variable pricing according to differential demand, is an application of the previous strategy, variable pricing to achieve 85 percent occupancy for on-street facilities, but differs from that strategy by setting prices based upon defined situations that elicit higher demand. Variable pricing according to differential demand is accomplished by charging higher prices for parking that is situated closer to more convenient locations (Anderson & Palma, 2004). In this strategy, a parking gradient is developed to optimize parking demand; parking spaces closest to destinations are priced higher because of the convenience they provide. If prices are not varied, spaces closest to destinations will be more desirable and over-used, leaving more distant parking spots to be under-utilized (Anderson & Palma, 2004). Similar principles can be applied to congestion in downtown areas; assessing a fee to all vehicles entering a downtown area increases peak hour flows while also increasing travel speeds, while variable fees that fluctuate depending upon marginal social costs incentivize the use of alternative modes of transportation (Vickrey, 1992).

For variable parking pricing to be successfully implemented, a high turnover rate in high demand areas is essential. This can be achieved by imposing time limits for areas of high demand, with the intention of encouraging short-term parking. To maximize parking efficiency and to increase parking revenues, parking authorities should try to maintain on-street parking assets for short-term patrons (2-3 hour maximum zones). If necessary, long-term patrons can be deterred from coming to the core of the city. This should be complimented by incentives to use carpooling or transit. Special parking areas, like loading zones, disabled spaces, and 15-30 minute spaces can also be used to offset demand (CUTR, 2001).

It is important to take into account the extreme difference between short-term

and long-term rates. Short-term parking demand is more inelastic than long-term parking demand which means that pricing can be used as an incentive to manage demand. "Raising parking prices might stimulate demand for short-term parking at the expense of long-term parking" (TRB, 2005, p. 3). Litman (2005) describes parking restrictions that were put in place to favor customers, and also shows how short-term users in Portland and San Francisco favored pricing structures in which fees increased with time. This is the opposite of the tendency in commercial parking to charge a higher rate for the first hour of parking, in order to take advantage of the unresponsiveness of short-term users to price (ULI, 2005).

Examples

In Highland Park, Illinois, the municipal parking organization implemented two- to three-hour parking restrictions for on-street parking and a number of off-street lots. They also increased the hours of enforcement for the two-hour parking time limit, and required motorists to relocate their vehicle at least 500 feet away to be considered a new space. In Portland, Oregon, motorists pay only $0.95 per hour for the first four hours of parking, after which the rate increases to $3 per hour starting with the fifth hour.

In San Francisco, California, no hourly parking rate (after the first hour) may be greater than four times the rate for the first hour of parking; however, the total rate for eight hours of parking must exceed 10 times the rate of the first hour (Litman, 2006a). This rule mandates parking providers to charge a lower rate for the first four hours, and a higher rate for motorist who park eight or more hours. Such pricing schemes incentivize short-term parking and high turnover rates because of the higher prices associated with long-term parking.

San Diego implemented a Smart Park project, similar to SF*park* in San Francisco, which is described below. It includes a variable pricing component, as well as reservation capabilities and real-time traveler information at transit and carpool stations. The goal to reach 95 percent capacity at each station was not met at the completion of the project in September 2010. However, the downturn in the economy has affected parking demand (FHWA, 2010b).

A variable pricing parking project was implemented in New York City in 2009. The goal of this program was to make the best use of curb space in order to increase street efficiency. Results from April 2010 indicated that turnover rates had increased; indeed, parking duration decreased by 20 percent between April 2009 and April 2010. What's more, parking occupancy was high, and reached as much as 82 and 92 percent

on two different streets (FHWA, 2010a). New York City, however, is not considered a peer city to Miami or Fort Lauderdale due to its significantly higher population, household and employment densities; as such these results should not be expected in South Florida.

Current Application in Project CBDs

In the Miami CBD, parking rates are generally higher in the southwest than the north, reflecting a pattern of differentiation according to demand. The MPA considers location when defining rates (A. Noriega, personal communication, May 3, 2010); however, on-street rates are practically flat in the CBD, suggesting that there is room for higher price differentiation.

In Fort Lauderdale, parking rates change according to location, with the highest prices occurring in high demand areas. On-street parking is also differentiated, although not with the goal of achieving 85 percent occupancy; rather, prices are set to reflect demand and encourage short-term parking in high-demand areas (D. Alarcon, personal communication, June 3, 2010).

Evaluation

Users usually consider the total cost of trips when deciding how they will travel to their destination. The strategy of pricing to manage demand is aimed specifically at decreasing vehicle travel demand. However, while pricing to manage demand does increase the cost of vehicle-based trips, it does not decrease the need for users to make trips. Increasing parking pricing to market rate would decrease the use of parking in downtown. Increasing the travel cost of automobile use would also create an incentive for travelers to use alternative modes of transportation that are more cost effective. While this strategy does not directly subsidize the cost of implementing alternative modes of transportation, money collected from parking could be allocated for transit or other transportation alternatives.

Variable pricing according to differential demand does not directly promote the development or expand the supply of alternative modes of transportation, but may do so indirectly. When demand for automobile use decreases, demand for other modes of transportation may increase, thereby promoting the increased supply of alternative modes of transportation. This strategy neither directly provides financial support for the regular operation of alternative modes of transportation, nor decreases the cost of providing it; however, officials can decide whether they want to allocate the monies collected for that purpose. Parking pricing to manage demand does not encourage

better coordination among alternative modes of transportation; however, it may, indirectly, make land use more efficient (e.g., condensed development rather than using land solely for parking) in downtown areas and improve the provision of alternative modes of transportation.

This strategy provides a good means for raising revenue. Generally, monies generated using this strategy stay with the parking agency, or are allocated to the municipality's general fund. Depending on the will of government officials, these funds may be earmarked for capital improvements in the downtown or regular operations of transit. Revenues generated using this strategy are variable because of the very nature of the strategy; the purpose of the strategy is to maintain a certain level of demand rather than a certain level of profit. Additionally, it is difficult to say if this strategy is self-sustaining due of the variability of technology costs. Capital costs for the implementation of technology (i.e., occupancy sensors) could be high.

The idea of varying parking prices is sensitive. Business owners and stakeholders may view this strategy as too expensive or confusing for patrons, resulting in the loss of business. The strategy, however, is clear, but may require educational programming so that the public can better understand its benefits and impacts. Indeed, both Miami and Fort Lauderdale are implementing this strategy to a certain extent, though neither city is implementing the strategy to attain an 85 percent demand for parking. Currently, both municipalities are using variable pricing in some areas and for special events, but a more uniform implementation would make the strategy more effective.

One added benefit of this strategy is that it is flexible; it can be tailored to best fit the needs of the community, perhaps making it more publically acceptable as a result. For example, the use of benefit districts, or specially designated areas in which nonresidents can use on-street parking facilities for the fair-market price, with the resulting revenue going towards the financing of public services within the district (Shoup, 2005), could make the implementation of variable pricing more publically acceptable. Generally, implementing this strategy does not require a new institutional framework or new laws. Varying parking prices to achieve a certain level of demand appears to be legally robust since similar strategies have been implemented in different cities around the country without legal recourse. Indeed, current State legislation does not prohibit the implementation of this strategy, and depending on how laws and regulations are written for each locality, functional agencies may have jurisdiction to funds produced by the strategy.

The strategy of varying parking pricing to achieve a certain level of demand is a

good technique. It can effectively decrease car trips, and may help increase alternative modes of transportation depending on implementation characteristics. The strategy is generally politically acceptable, especially if attendant educational programming can be used to help the public better understand its purpose. Assuming technology costs are not prohibitive; this strategy can also be used to generate additional funds for alternative purposes, such as public transportation.

Recommendations

The strategy of pricing to manage parking demand is suitable for Fort Lauderdale and Miami (see Tables 5 and 6). Examples of variable prices are currently being used in certain locations during special events, though they are used for the purpose of increasing profits rather than eliciting a specific demand for parking. In Fort Lauderdale, this is especially true around the courthouses.   In Miami, this is true around the American Airlines Arena (AAA). If this strategy were to be implemented universally, best practice literature suggests that the demand for parking would decrease throughout the entire downtown area. This would allow MDT and BCT to fill the void for travelers with other modes of transportation, and require less parking in the CBDs.

Based on interviews with stakeholders and evidence from transit ridership levels, the parking supply exceeds demand in both downtown Miami and downtown Fort Lauderdale. The oversupply of parking is exacerbated in both cities by privately-owned parking facilities, which are reserved for specific users not included in the inventory, such as employees, residents, or patrons. This market saturation makes it difficult to effectively implement a parking pricing strategy to affect demand. An oversupply of parking allows more opportunities for drivers to circumvent the system and more readily find cheaper parking in other areas. It is recommended that city officials work with their respective municipal parking agencies and private vendors to better match parking supply and demand. Further, successful implementation of this strategy will require the MPA and Fort Lauderdale's DTM to initiate the policy framework necessary to vary parking rates according to demand.

B.   FUNDING

The following section is a review of funding strategies that provide a source of revenue from parking operations.   These strategies include implementing benefit districts and increasing fines as a function of parking pricing.   Benefit districts are a concept related to parking revenue allocation.   In parking benefit districts, funds can serve to benefit the community and subsidize alternative modes of transportation. Rather than increasing parking rates, increasing fines is a strategy that provides an alternative to increase revenue collection from parking. These strategies also support TDM objectives, as they increase the price of automobile use.

BENEFIT DISTRICTS

Description

Many neighborhoods across the country reserve curbside parking for residents, via permit, in parking permit districts. In parking permit districts, residents are provided a free on-street parking permit or may be required to pay a fee. Instead of a typical parking permit district, an agreement can be made to prioritize revenue generated from priced on-street parking.   These districts are called parking benefit districts (VTPI, 2010), which Shoup (2005) describes as a compromise between:

> …free curb parking that leads to overcrowding and permit districts that lead to underuse. The benefit districts are better for both residents and nonresidents: residents get public services paid for by nonresidents, and nonresidents get to park at a fair-market price rather than not at all.

Benefit districts differ from conventional permit districts in two important ways. First, nonresidents are allowed to use on-street parking facilities in a benefit district if they pay the fair-market price (Shoup, 2005). Second, the resulting revenue is used to finance additional public services (including transportation improvements) within the benefit district (Shoup, 2005).   The idea is that business owners and parkers will be more willing to accept increasing parking fees if they know that part of the product is going to be shared with the community and spent in investment that will increase the quality of life in the area. Shoup (2005) identifies typical acceptable improvements, such as "cleaning the sidewalks, planting street trees, improving store façades, putting overhead utility wires underground, and ensuring public safety" (p. 398). Monies can also be allocated towards the capital or operational budgets of transit operators. Earmarking parking funds to transit would help fund the cost of alternative modes of transportation.

VTPI (2010) establishes that "neighborhoods should have the ability to utilize pricing strategies to manage parking demand while returning benefits to the area in which revenues are collected." The public will be hesitant to support parking price increases without a clear link to transportation improvements within their residential district. VTPI (2010) explains:

> By pairing the PBD [parking benefit district] concept with price-based regulation there is even greater opportunity for neighborhoods to reap the benefits of pricing - through improved parking reductions and a reduction in traffic volumes, as well as through funding available to invest in local transportation projects. Currently, parking revenues are a crucial source of locally-generated and locally-controlled funding, which [could be] prioritized to support transit operations. Reinvestment of a portion of future new revenues will encourage neighborhood-level support for parking pricing, thus increasing the overall pool of funds… (A Recommended Approach to Neighborhood Management: Parking Benefit Districts, para. 7)

An appropriate price point should be set for residents that have the preferential benefit of parking in the benefit district (VTPI, 2010). Residents of the district would be allowed to purchase monthly permits for on-street parking similarly to residential permit districts, but "permits should be priced at a high enough level to appropriately value on-street space and reduce demand for on-street parking (by encouraging off-street parking, reduced vehicle ownership, etc.)" (VTPI, 2010).

According to Shoup (2005), there is no need to create new institutions to manage parking benefit districts because a logical substitute already exists in the form of business improvement districts (BIDs). To overcome resistance from cities that might be afraid to lose revenue when it is transferred to parking districts, Shoup (2005) proposed 'Parking Increment Finance Districts' in which cities only return the increases on parking revenue over the base line. As described, this strategy is not only complementary to pricing-based revenue strategies but also to fine-based strategies because the participation of the main stakeholders increases control and enforcement.

Examples

Old Pasadena, the historic downtown area of Pasadena, California, was a declining commercial district from the 1930s to the 1980s (Shoup, 2005). In the 1990s, the city installed meters and offered to share the revenue and use it to pay for public investments in the area. This compromise encouraged acceptance from property owners that initially opposed the idea because they thought that charging for parking

was going to depress sales. Parking rates were set at $1 per hour and the hours of enforcement included Saturdays and Sundays.

After installing the meters, the city borrowed $5 million, with the anticipated meter revenue dedicated to repaying the debt. This money was spent on street furniture, trees, tree grates, and historic lighting fixtures. In 2001, the nearly 700 parking meters yielded $1.3 million, or about $1,800 per meter. Additional revenue from valet services and the return of investment earnings increased the total revenue to just over $2,000 per meter. With capital and operating expense of $380 per meter, the net revenue per meter reached about $1,700 (or just shy of $5 per day). That represented $1.2 million to fund additional public services in the area.

This created a cycle of continuing improvement in which more visitors meant more revenue, more revenue meant more investment in the area, and more investment meant more visitors. For that reason, all meters in Old Pasadena have stickers saying "Your meter money will make the difference in Old Pasadena." In addition, Old Pasadena implemented a policy of in-lieu fees that allowed developers to pay only $115 a year per space. This created an incentive for opening business and adaptive reuse of historic buildings. As a result, revenues from retail sales taxes increased exponentially in Old Pasadena from less than $200,000 in 1989 to more than $2,000,000 in 1999.

In San Diego, 45 percent of meter revenue is returned to the districts that generate it (Shoup, 2005). For instance, the three Parking Meter Districts received $2.2 million in 2002, allocated based on the number of meters installed in each area. This revenue funded investment in parking, transportation, signage, maintenance, landscaping, and security. The transfer of revenues back to the community has also encouraged communities to play a more active role in proper pricing and control. As a result, general collection increased in addition to parking availability.

The Canadian City of Montreal has a budgetary provision for special tax structure on downtown parking spaces. A premium tax policy is applied to lots in the downtown area; parking lots in the CBD are taxed at a higher rate than their counterparts in residential areas. Surface parking is also taxed at a higher rate than structured parking. "The charges range from $4.95 per square meter for neighborhood structured parking up to $19.80 per square meter for CBD surface parking, or $75 to $300 annually for a three by five meter space. The city expects it to collect around $20 million dollars per year which is earmarked for improving public transit" (Alfaro, 2010).

In 1970, the City of Boulder, Colorado, implemented the first parking benefit district in the U.S., named the Central Area General Improvement District (CAGID).

Current goals of the CAGID include improving downtown access, managing and supporting public space, and promoting downtown business. The CAGID attempts to promote transit, walking, and bicycling, with the goal of decreasing the number of single-occupancy vehicles (Weinberger, Kaehny, & Rufo, 2010). Parking pricing manipulation is used in conjunction with benefit districts, with curb and off-street public parking set at equivalent rates for the first three hours, and curb time limited to three hours. After four hours, the off-street rate doubles.

This strategy encourages commuters to carpool, use transit, or park for a premium off-street, leaving curb parking available to shoppers and tourists (Weinberger et al., 2010). At the same time, parking revenue is allocated to transit service and public space revitalization. Private parking garages in Boulder differ from the CAGID strategy by setting higher rates for the first hour or two and subsequently charging marginally low rates (Weinberger et al., 2010). This method assumes that short-term trips are less elastic with respect to price than long-term trips, and that turnover from short-term parkers incurs a higher labor cost (Weinberger et al., 2010). Ultimately, Boulder's single occupancy vehicle reduction goal was achieved, as only 36 percent of district commuters drive alone (Weinberger et al., 2010). Summaries of Boulder's parking strategy and inventory are shown in Tables 7 and 8.

TABLE 6 - PARKING INVENTORY, PRICE AND USE

Public Parking Facility Type	Parking Spaces	Percent of Inventory	Percent Of Drivers Using Facility	Rate	Policy
Curbside Metered	871 spots	23% spots	38% users	$1.25/hr.	3 hour limit
Off-Street Structured	2209 spots	59% spots	30% users	$ 1.25/hr.	$2.50/hr. after 4 hour

Source: Weinberger et al., 2010, p. 57

Current Application in Project CBDs

Fort Lauderdale allows residents to petition for a residential parking permit district (ULDR, Sec. 26-166, Designation of residential parking permit districts). Unified Land Development Regulations (ULDR) Sec. 26-168 outlines the conditions and criteria for designation of residential parking permit districts. The residential area may be eligible if on-street parking is impacted by non-resident vehicles during a certain period of the day.   The permits are issued by the designated parking manager, who is the owner of a property in the district. There are currently no

initiatives to implement benefit districts in the Fort Lauderdale CBD (D. Alarcon, personal communication, June 3, 2010); however, the parking authority has earmarked some resources for the beach area.

TABLE 7 – BOULDER, COLORADO PARKING PROFILE

Boulder, Colorado	
Population	91,685
Daytime Population	140,000
Density	1,671 people/sq. mile
Metered Spaces	1,445
Revenue to	TDM*/BID**
Residential Permit	Yes
Multi-space meters	Yes

*TDM/ **BID
Source: Weinberger et al., 2010, p. 56

There are currently no neighborhood revenue-sharing agreements related to parking in Miami's CBD (A. Noriega, personal communication, May 3, 2010), however Coconut Grove currently has a parking benefit district.

Evaluation

Benefit districts are a good way to introduce priced on-street parking. Since collected funds are returned to that area, it reduces opposition from residents and businesses from priced parking. Benefit districts increase the cost of automobile trips, which, in turn, may decrease the demand for automobile trips and create incentives for travelers to use alternative modes of transportation.

Benefit districts can increase the supply and support the efficacy of alternative modes of transportation if the money is earmarked for improvements to sidewalks, streetscapes and transit in the area. Improvement to sidewalks and streetscapes promotes walkability, and may promote development of alternative modes of transportation and encourage coordination with transit providers. The allocation of funds to transit services promotes the development of transit infrastructure. Funds may also be allocated to operational expenses for alternative modes of transportation. Increased funding could encourage better coordination among different modes of transportation. A benefit district does not, however, encourage the provision of transit by influencing the density of development.

The main social benefit of benefit districts is that monies collected in a certain

area will be used for capital improvement in that area. It is highly desirable that funds are reinvested back into the community from which they were generated. There is no identifiable social cost, so it is easy to say that benefits outweigh costs for this strategy. This strategy is not intended to provide a means for municipalities to generate revenue for other purposes.

Benefit districts are not likely to be particularly controversial. Business owners and residents are likely to see positive effects as a result of this strategy. However, entities that typically receive parking revenues may oppose the idea of benefit districts. This problem can be overcome if incremental pricing is used in conjunction with benefit districts. This idea is similar to Tax Increment Financing, where parking prices would increase and the resulting added revenue would be allocated back to the community. This could help to satisfy all involved parties. In order for this to occur, a new institutional framework (that may require the enactment of new laws) must be developed so that money can be legally transferred from the collecting agency to the neighborhood association. However, this strategy appears to be legally robust since it has been implemented in cities around the country. Existing State of Florida legislation does not appear to prohibit the implementation of this strategy. Once implemented, the neighborhood association would assume jurisdiction over the funds and how they are allocated within the community. Because this strategy is very flexible, it can be tailored to the needs and wishes of the community.

The primary purpose of this strategy is to provide an allocation option for parking revenues. The strategy may decrease car trips if used in conjunction with demand-based parking pricing. It may also increase alternative modes of transportation if revenues are allocated to transit. Benefit districts have a net positive benefit and are generally very accepted, which makes implementation easier. Neither CBD currently employs this simple-to-use strategy, so it is very desirable, especially as it can be implemented in a short period of time.

Recommendations

Benefit districts are recommended for implementation for both Fort Lauderdale and Miami (see Tables 5 and 6). Miami is not currently implementing benefit districts, but Flagler Street may be a good place for Miami to start. Flagler Street vendors are proud of their commercial district and will likely support this strategy, which would provide funds for capital improvement in their area.

Fort Lauderdale is also not currently implementing this strategy. Benefit districts should be implemented as part of the city's long-term plans. Residents and business

owners would likely appreciate the local allocation of parking revenues.

To make this strategy work, it will take a concerted effort from the municipal parking authorities and transit authorities in both cities, along with the neighborhood associations deemed appropriate, to allocated parking revenues. If revenue is allocated to transit agencies, it would help with budget short falls and ensure the continued operation of transit services in the municipality. If nothing else, this strategy can be used to gain the support of the community, since it would show a concerted effort by the respected cities to reinvest in their community. Many social benefits can be achieved with this strategy, and a study of the strategy's implementation in the CBD is highly recommended, since this policy could increase revenue, control, and public acceptance.

INCREASE FINES AS FUNCTION OF PARKING PRICE

Description

Increasing revenues through parking fines is thought to be easier to implement than increasing parking rates. This is because increasing parking rates is not politically popular (Miller, 2010). Taking into account that in a "typical downtown case, cities collect only 41 percent of the charges that drivers should have paid for the time they spent at parking meters" (Shoup, 2005, p. 529), increasing enforcement can be a very important source of revenue. Despite the high potential for increased revenue, fees should be maintained at levels that the public would consider 'fair.' For the average infraction, the parking fine should be between two to five times the daily rate (Litman, 2006a).

Increased enforcement improves the probability of catching parking violators; this can be empirically described as the fine multiplied by the probability of citation. If the probability increases, the expected revenue increases. In the extreme case, perfect enforcement should reduce fine revenue to zero because violators would be certain they would be caught. For this reason, cities could "maintain fines as a source of revenue by increasing the fines for violations rather than increasing the effort to cite violators" (Shoup, 2005, p. 429). This situation is not optimal because increasing fines can be unpopular. In any case, the main goal of the enforcement structure should be to provide convenient parking and not to maximize revenue. For that reason, parking authorities should charge adequate fines and maximize enforcement.

Examples

Highland Park, Illinois, increased parking fines from $10 to $15, with higher fines if motorists accrued multiple parking violations in a 30-day period (Litman, 2006a). In Boulder, Colorado, a notice is sent to remind motorist of common mistakes that result in parking tickets. In the case of Berkeley, California, a study was developed to characterize violations. Results showed that a high rate of violations was explained by poor enforcement and broken equipment (Litman, 2006a).

Current Application in Project CBDs

The average fine in Fort Lauderdale ranges from $25 to $50. Based on the suggestion of charging two to five times the daily rate, Fort Lauderdale is within the suggested range. With a median hourly rate of $1.25, and assuming an average utilization of 8 hours per day, the calculated fine should be $20 to $50. Because fine revenue is returned to the DTM budget, there is an incentive for robust enforcement.

The average fine in Miami is $18 (A. Argudin, personal communication, October 22, 2010). Given the median hourly rate of $4, and assuming an average utilization of 8 hours per day, the suggested standard of two to five times the daily rate yields a suggested fine of $64 to $160. This means that the fine could be increased. Revenues from fines currently go to the city's general fund (A. Noriega, personal communication, October 27, 2010). Allocating the fines to the MPA could create an incentive for better enforcement. In addition, the MPA has been increasing enforcement efforts through investment in equipment and new technology.

Evaluation

This strategy is not intended to increase the cost of automobile trips, and it does not decrease the need to make trips. It does not incentivize travelers to use alternative modes of transportation, and it does not decrease the price of these modes. It also does not affect the actual price of parking. However, it does increase the cost of automobile use for individuals that park illegally.

Increasing parking fines is not related to the development of alternative modes of transportation, and it does not provide financial support for those modes because it does not directly subsidize the cost of alternative modes of transportation to the provider or affect the provision of those services. It also does not encourage coordination between different modes of transportation. This strategy, however, could be used in conjunction with earmarking of revenues for transit, which would help to subsidize the

provider cost of alternative modes of transportation.

The social benefit of this strategy is that more public money will be available as a result of increasing parking fines. The main social cost is placed on the individual – people that knowingly or unknowingly violate the parking regulations are subject to fiscal penalties. The positive attributes are likely to outweigh the negative because users are only penalized if they do not abide by the parking regulations.

Increasing fines provides a means to generate revenue, and is easy to implement. Revenue generated from fines may be allocated to different funds depending on the rules set forth in the municipality. For example, government officials can allocate this money to capital improvements or to the operation of transit facilities. Its only cost of this strategy is associated with the personnel who enforce parking. Indeed, the use of technological systems to collect fines may affect the net revenue of implementing this strategy. However, revenues associated with this strategy are likely to outweigh the cost assuming that vagrant parking is not significantly deterred and possible technological costs are not too high. Ultimately, the financial stability of this strategy depends on the willingness of patrons to continue to park illegally.

Increasing parking fines is a clear strategy, and its positive characteristics can be easily expressed. This strategy attempts to circumvent the politically sensitive topic of parking pricing changes by only raising the price for parking violators rather than raising the price for all users. Though stakeholders do not have the power to influence the decision to implement this strategy, stakeholders are more likely to accept this strategy than one that raises parking prices. .

Increasing fines for violations does not require new institutional framework, but it may require new laws in order to be implemented. This approach is legally robust and there should be no legal problems associated with the implementation of this strategy. Current State laws do not prohibit the implementation of this strategy, as fines already exist as a form of penalty for parking violators (State law reference - Authority to raise fine for disabled parking violations, F.S. § 316.008(4); civil penalty for violation of parking tickets and liability for payment thereof, F.S. § 316.1967). Although different agencies may have jurisdiction over the results of this strategy depending on which organization is entitled to the funds collected through fines, this strategy is good because it can be modified and tailored to the needs of the community.

The purpose of this strategy is not to affect travel demand or supply, the purpose is to generate revenue, and it is effective at doing that. This strategy is generally publically accepted but is not being fully implemented in Miami, increasing its desirability

in this case. Fort Lauderdale is currently employing this strategy correctly, so this strategy is less desirable for that municipality.

Recommendations

Fort Lauderdale is currently executing this strategy according to best practice standards (see Tables 5 and 6).

Miami is not currently utilizing this standard to best practice standards. Miami should consider increasing fines by two to five times the average daily parking rate, with the MPA acting as the implementing agency of this strategy.

For both cases, it should also be noted that if parking rates were increased, fines for parking violators should increase as well. Processes should also be put in place to penalize recurrent violators and collect outstanding debt. Generally, the fines should increase the longer that they remain unpaid, in order to promote prompt payment (Litman, 2006a). Additionally, vehicles with numerous unpaid fines should be immobilized or towed, and driver license renewal should not be permitted until outstanding violations are paid.

C. COORDINATION OF PARKING AND LAND USE

The following section is a review of land use strategies that change the supply and demand for parking in Urbanized Areas. These strategies serve as alternative policies to minimum parking requirements. Strategies like parking reductions, shared parking, parking maximums, unbundled parking, parking exemptions, and the ability for developers to negotiate parking can reduce the supply and demand for parking. Incentives for smart growth, taxed parking, and parking policies to encourage alternative modes of transportation can further mitigate parking requirements.

Parking facilities are a land use and should not be overlooked as such. These include park-and-ride sites, commercial pay-for-parking sites, parking garages, and surface lots used for parking. The parking provided by the public sector is usually a permanent land use; however, lots provided by the private sector may be accessory to a principle use, or interim uses awaiting development or redevelopment. In some cases, downtown parking areas produce positive cash flow, with minimal infrastructure and maintenance required, and have become permanent land uses due to either a shortage of parking or the convenience of their location.

Current development trends in the U.S. show that building permits for new single family homes fell 42 percent nationwide in 2007-2009 (Freilich & Popowitz, 2010). Permits for multi-family buildings, however, have fallen only 11 percent. While much of the decline can be attributed to the recession, the difference in decline could also be an indication that "new urbanist, compact, transit corridor and mixed use, walking, traditional neighborhood development patterns with increasing density have already begun to take hold" (Freilich & Popowitz, 2010, p.3). Both preference for urban living and concern for the environment are strong drivers in the relocation of residents and businesses back into city centers. At the heart of sustainable development practices is a newfound acceptance of the interdependency between accessibility and land use.

Land use strategies are implemented though zoning, comprehensive plans, design guidelines and land development regulations (Hendricks & Seggerman, 2005). Minimum parking requirements are a common, more traditional land use strategy to manage parking (Shoup, 2005). This strategy, however, counters efforts by communities promoting sustainability, multimodality, and reduced congestion. To fully comprehend the impact of land use on parking, the research team synthesized the information gathered in the previous technical memoranda and addressed the issues that were identified into the following components. These components are used throughout this report for consistency and comparison in each section.

PARKING REDUCTIONS

Description

Parking reductions are a relaxed version of minimum parking requirements, and can reduce the overall supply of parking (Everett-Lee, 2001). Parking reductions are implemented based upon minimum requirements, but allow developers and businesses to supply only a percentage of the number of parking spaces required. To qualify for a parking reduction, developments and businesses must meet certain criteria, such as proximity to a transit station; location in a downtown area; availability of alternative parking (e.g., municipal parking garage and/or on-street parking); mix of uses with off-setting parking demands; or the inability of a site to meet the current physical requirements for parking. For example, if a development is located in the vicinity of a rail station, a local jurisdiction could allow a 20 percent reduction in the parking requirement for that development (Litman, 2006b).

Shared parking is a supply management strategy that refers to off-street parking supply that is jointly available for use by several demand generators that have separate and distinct peaks in parking demand. This strategy can help optimize use of available land and reduce oversupply of parking. Since parking is a derived demand, that demand can be estimated for the different generators based upon the type of establishment of each generator. Predictable demand generators that are considered compatible for shared parking have different demand peaks; for example, banks generally require parking during the day while theaters require parking in the evening, and thus are potentially suitable to share parking facilities. Table 9 provides examples of the peak parking demand for different land use types.

TABLE 8 - PEAK PARKING DEMAND

Weekday Peaks	Evening Peaks	Weekend Peaks
Banks Schools Distribution Facilities Factories Medical Clinics Offices Professional Services	Auditoriums Bars and Dance Halls Meeting Halls Restaurants Theaters	Religious Institutions Parks Shops and Malls

This table indicates peaks, parking demand for different land use types. Parking can be shared efficiently by land uses with different peaks.
Source: Victoria Transportation Policy Institute, 2010

Shared parking is an inexpensive method for utilizing parking supply and land

area more efficiently.   Qualifications for parking reductions can be used in conjunction with shared parking, such as close proximity to mass transit opportunities and location in CBD-like areas. Projects like transit oriented developments (TOD) and mixed used developments are highly suited for parking reductions. Studies have shown that shared parking can reduce the need for off-street parking by as much as 60 percent (Smith, 1983).

Shared parking can be implemented through zoning, overlays, or in specific districts.   Shared parking can also be assigned to individuals, shared between sites, or provided in public facilities rather than by each building. Shared parking works well in areas with mixed land use and with different peak parking demand periods (ITE, 2010). For further information, shared parking as it relates to sustainable land use was discussed in detail in Technical Memorandum 5 (see Steiner, Jourdan, Blanco, Mackey, Sucar, Hanley, Shmaltsuyev, Sucar & Rachmat, 2011a).

Examples

Parking reduction best practices are best exemplified in highly urbanized areas supported by multi-modal transportation centers, and in the provision of sufficient parking by both the public and private sectors in the form of municipal (e.g., public) parking structures and private (pay by-the-hour/day) lots.   For example, Los Angeles allows a 40 percent parking reduction for new residential development, and a 60 percent reduction for some commercial and civic activities, in districts established around specific metro stations.

Many communities utilize shared parking provisions in their plans and codes, and several good examples of model ordinances can be found on-line, along with justification for shared parking in downtown areas.   Examples include a Shared Parking Agreement from the City of San Diego (City of San Diego, 2009; Stein Engineering, 2002).   The parking provided by the public/private sectors is usually a permanent land use; however, lots provided by the private sector may be interim uses awaiting redevelopment, such as in Dallas, Texas.   Recent economic conditions may have exacerbated the provision of temporary parking because redevelopment projects have been temporarily shelved and the land is being used for parking. In some cases, downtown parking areas produce positive cash flow with minimal infrastructure and maintenance required, and become permanent land uses.

The City of Seattle permits parking reductions, although parking cannot be reduced by more than 40 percent of the minimum parking requirements in pedestrian designated zones (City of Seattle Municipal Code, Section 23.54.020, Parking quantity

exceptions). The Code also allows for reductions based on transit service and alternative transportation programs, and offers a good model (City of Seattle Municipal Code, Section 23.54.020).

Current Application in Project CBDs

Fort Lauderdale has already implemented a parking reduction in the outer limits of the CBD. The downtown parking exemptions and reductions in the City of Fort Lauderdale were implemented in 1996 after a study was conducted that found there was sufficient number of city owned parking spaces in the downtown (D. Alarcon, personal communication, June 3, 2010). The parking exemptions and reductions were put in place to promote downtown redevelopment and to curb demand for parking. Currently, there is no problem with overutilization in the city's managed parking lots, so there is no need to build new parking facilities (City of Fort Lauderdale, 2008; D. Alarcon, personal communication, June 3, 2010). A recent study of the City's barrier islands has yielded a new regulatory framework that should be in place by April 2012 (D. Alarcon, personal communication, December 14, 2011). The city should continue to ensure that the development of future city-owned parking facilities is in close proximity to end-users and areas of insufficient parking.

The City of Fort Lauderdale has defined several different zones (Figure 4) in the downtown after the Broward County Board of County Commissioners designated the area a Downtown Regional Activity Center (Downtown RAC). The Downtown RAC is made up of the following zones:

- Urban Village (RAC-UV)
- Residential and Professional Office Center (RAC-RPO)
- Arts and Science Center (RAC-AS)
- Transitional Mixed Use Centers (RAC-WMU, RAC-SMU, RAC-EMU)

Parking reductions and exemptions vary throughout the different Downtown RAC zones. For instance, residential developments within the RAC-CC and RAC-AS districts are exempt from providing off-street parking requirements, while residential land uses in zones RAC-UV, RAC-TMU, and RAC-RPO districts have a parking reduction that require only 1.2 parking spaces per dwelling unit instead of 2 parking spaces per dwelling unit.

Nonresidential uses are exempt from parking requirements in the City Center and the RAC-AS district, except for development located within 100 feet of the RAC-UV, RAC-RPO, and the Transitional Mixed Use Districts, as well as development that is

greater than 2,500 square feet in gross floor area. These developments are allowed a 40 percent reduction in parking space requirements. All other nonresidential development in the Downtown RAC must supply the same ratio of parking spaces that are mandated in the general city parking requirements.

FIGURE 4 - DOWNTOWN RAC ZONES
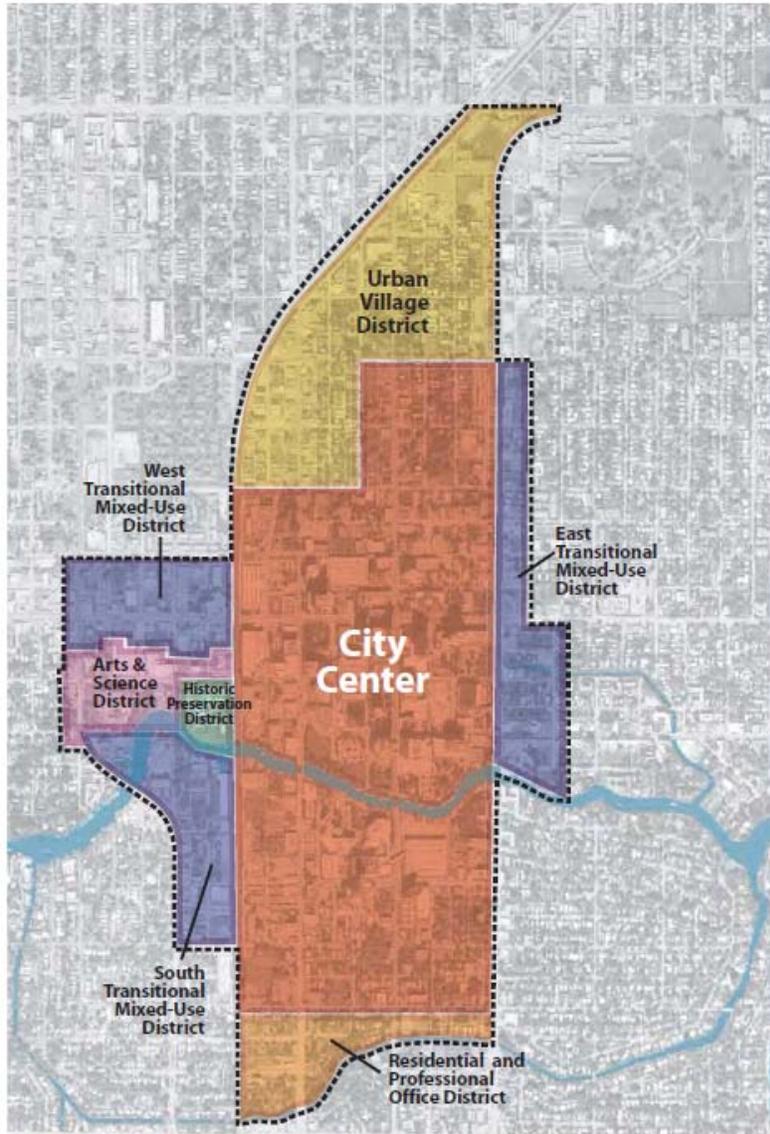
[Figure 3.72] Zoning designations and boundaries.

Source: Fort Lauderdale Downtown Master Plan, page 3.37

Developers and businesses that are unable to provide the minimum number of parking spaces due to site constraints are allowed to apply for a parking reduction through the development review process outlined in ULDR Sec. 47-20.3. The criteria for parking reduction in Fort Lauderdale are vague, although this may be intentional in order to provide flexibility in administration. Only criterion #2 and #3, which contain a

45

measurable metric, provide sufficient direction to justify a reduction in parking.   As has been stated above, however, the city has provided adequate parking in the downtown area and parking reductions are justified.

Fort Lauderdale does not have specific policies for shared parking; however, shared (or combined) parking is allowed in accordance with Section 47-20 of the municipal code Fort Lauderdale, 2011a). To be successful, shared parking needs the right commercial environment (A. Noriega, personal communication, May 3, 2010). Shared parking does not necessarily work between residential and commercial properties, since there is overlapping demand; however, it can decrease the number of spaces needed. The difference is due to expectations of shared parking.

In Miami, shared parking is considered when the MPA conducts feasibility studies. The policies are done on a per-site basis, so no standard has been established for the whole city (A. Noriega, personal communication, May 3, 2010).Miami has parking reductions for elderly and low-income housing (Miami 21, Sec. 3.6.7, 2010) and shared parking for mixed use (Miami 21, Sec. 3.6.1, 2010).   The code states "Parking reductions shall not be cumulative except in T6-36, T6-48, T6-60 and T6-80. Parking reductions shall not exceed fifty percent (50%) of the total Off-street Parking required, except for Residential components of projects within one thousand (1,000) feet of Metrorail or Metromover" (Miami 21, Sec 3.6.1, 2010).

In the T6 urban core zone, Miami allows the parking ratio to be reduced for several land uses, including residential uses greater than 65 units per acre**.**   If these sites are within a ½ mile radius of a TOD and within a ¼ mile radius of a transit corridor, parking may be reduced by thirty percent (30%) through a waiver process.   These reductions apply throughout the City, except in fringe areas (e.g., where the T6 zone is within 500 feet of a T3 zone) (Miami 21, 2010). Miami has implemented shared parking ratios that are calculated using a shared parking standards table (Figure 5).

Evaluation

Parking reductions can result in greater demand for parking spaces and the potential for "cruising" to find or locate premium parking.   Conventional wisdom is that less parking will result in greater use of mass transit, acceptance of greater walking distances, less heat gain (e.g., paved area), and more land available for green/open space.   However, if convenient mass transit alternatives are not readily accessible, the outdoor environment is inhospitable, and/or building envelopes are maximized (as they usually are in a downtown area), parking reductions could increase demand and the potential for cruising.

FIGURE 5 - BUILDING FUNCTION - PARKING AND LOADING

SHARED PARKING STANDARDS

SHARING FACTOR

Function	with	Function
RESIDENTIAL		RESIDENTIAL
LODGING		LODGING
OFFICE		OFFICE
COMMERCIAL		COMMERCIAL

The shared Parking Standards Table provides the method for calculating shared parking for buildings with more than one Use type. It refers to the parking requirements that appear in Table 4.

The parking required for any two Functions on a Lot is calculated by dividing the number of spaces required by the lesser of the two uses by the appropriate factor from this Table and adding the result to the greater use parking requirement.

For instance: for a building with a Residential Use requiring 100 spaces and a Commercial Use requiring 20 spaces, the 20 spaces divided by the sharing factor of 1.2 would reduce the total requirement to 100 plus 16 spaces. For uses not indicated in this chart on a mixed use lot a sharing factor of 1.1 shall be allowed. Additional sharing is allowed by Warrant.

Source: Miami 21 Zoning Code, Article 4, Table 5

Shared parking does not decrease the demand for automobile trips; however, shared parking can reduce the supply of parking by making a more efficient use of the existing parking supply. . Shared parking can be implemented through a combination of zoning regulations and development regulations, and works best in areas with mixed land use and with different peak parking demand periods (ITE, 2010).

Parking reductions do not increase the supply of alternative modes of transportation, but they do promote the use of alternative modes. Parking reductions can be used as a way to negotiate an increase supply for alternative modes of transportation. Parking reductions are applicable in specialized areas that meet certain criteria (e.g., mixed use, TOD), and that provide a variety of transportation choice. The following represent some of these criteria:

- Close proximity to a transportation center (train station, bus station, people mover, taxis stand, etc.);
- Within x feet of the primary destination. (This length can be longer or shorter depending on the quality of the outdoor environment and route. For example, a heavily shaded and/or partially enclosed or covered route could be longer.);
- Close proximity to public and/or private parking land use (e.g., municipal parking garage, pay by the hour lot, metered parking);
- Availability of primary and secondary on-street parking;
- Shared parking between uses and business not on the same property or lot;
- Mix of land uses in the same project with noncompeting hours of operation and demand for parking; and

47

- Availability of alternative modes of transportation (e.g., bicycle, scooter, zip car, rickshaw).

Shared parking does not increase the supply of alternative modes of transportation, although it does promote more compact urban form, which indirectly supports alternative transportation. This strategy attempts to strike a balance between parking demand and the availability of parking between two or more uses in a defined area. A good balance will ensure excess parking is not provided, thereby promoting other forms of transportation.

Parking reductions are cost efficient for developers and business owners, but may result in higher consumption of fuel, greater greenhouse gas emissions, and higher vehicle maintenance costs if parking demand is not balanced with alternative modes of accessibility. The initial cost savings from reduced parking supply could be offset, or negated, by potential shortfalls and/or retrofit costs to accommodate other modes of mass transit in confined spaces. Reducing parking supply could also increase demand for parking, which would have a negative cost to users due to higher prices for parking. However, shared parking is cost efficient and reduces development costs, and may also promote in-fill development and redevelopment. . What's more, this strategy also promotes working relationships between multiple landowners, and fosters focus on economic goals and property maintenance.

Reduced parking supply for municipal parking tends to result in reduced revenue from parking meters and municipal parking lots/garages. Demand for parking from private sources could increase; however, parking as a principal use in a CDB is inconsistent with most downtown economic/development goals and could negatively affect the demand for mass transit. Shared parking arrangements may not result in additional revenue for a local jurisdiction, unless the agreement is with the jurisdiction and not the property owner providing parking to the user; however, shared parking tends to provide some form of economic benefit to both parties (owner-user), whether that's in the form of reduced rent, decreased maintenance costs, or lower development costs.

Parking reductions, as an option to developers, are politically and socially acceptable, especially as a cost saving measure by reducing up-front development costs. Implementation of parking reduction programs are relatively easy, although careful monitoring is necessary to ensure well balanced demand is met with accessible alternative modes of transportation. Additionally, imposed reductions that decrease economic development or the perception of land value could have potential legal consequences. The shared parking strategy is an acceptable method to satisfy parking

requirements in most jurisdictions. Shared parking is relatively easy to implement based on "shared parking" agreements; however, the initial assumptions that were made to grant the allowance for shared parking must be monitored to ensure accuracy and any change in use or demand.

Parking reductions may result in a shortage of *convenient* parking. Convenient parking, in many ways, is just as important as sufficient parking. If parking is not convenient, the amount of parking provided is not relevant. A major exception to this rule relates to specialized parking areas and events when motorists *expect* extended delays finding parking or long walks to final destinations (e.g., basketball arenas, football stadia). In most cases, the perception of insufficient parking is not because of a shortage in the number of parking spaces available; rather, this perception results from the insufficient supply of parking in close proximity to a destination, poorly designed parking areas, or parking mismanagement (e.g., valet parking utilizing preferred parking areas). Shared parking is a desired method for meeting demand; however, restrictions may be required to enforce, or modify, initial assumptions. A successful program can result in a win-win by ensuring demand is satisfied by the minimum spaces necessary to serve an area. The overall desirability to implement this strategy is high.

Recommendations

Both cities allow shared parking. However, the policy is not fully implemented in Fort Lauderdale because specific ratios have not been outlined in the land development regulations (see Tables 5 and 6). Fort Lauderdale is in the process of implementing a new regulatory code, which is the result of another study. However, ULDR Sec. 47-20.3 (Reduced Parking) should be reviewed and revised to include a metric for each criterion for a waiver from the standard. The City of Fort Lauderdale should also create parking programs similar to the City of Seattle for each district, to more fully utilize the parking in neighborhoods and districts outside the CBD (A. Schwartz and B. Bryant, personal communication, August 23, 2010).

The City of Miami should conduct a parking study to ensure sufficient parking is provided in each sector within the City. The City should use the study to analyze the need and/or potential to provide additional parking or allow parking reductions based upon the local demand in each sector, and to update the City's parking requirements to reflect current demand. The City should also consider variable pricing methods, and implement a pilot program in a portion of the CBD to gauge its success.

PARKING MAXIMUMS

Description

Parking maximums are a land use strategy to reduce parking supply (Everett-Lee, 2001). A parking maximum limits the development of on-site parking in order to intensify land use and discourage the use of the automobile by putting a cap on the number of parking spaces that can be supplied on-site (TRB TCRP, 2003). Parking caps can reduce the amount of land dedicated to parking (McCahill & Garrick, 2009). The theory is predicated, in part, on the position that most businesses and retailers provide, and desire, an overabundance of parking. It is a retailer's worst fear to have insufficient parking, especially on historically heavy shopping days (e.g., "Black Friday", the day after Thanksgiving). Local governments have combated the desire to provide parking for the day of greatest demand by instituting parking maximums.

Limiting the amount of public and commercial parking is a deliberate disincentive to driving that may "reinforce the notion that the cars should be used with restraint" and encourage the use of other viable travel options (McCahill & Garrick, 2009). Ultimately, reducing the number of spaces required can produce a number of positive outcomes, including the following: additional property tax revenue, reduced land consumption, improved walkability, increased viability of alternative transportation modes, reduced environmental degradation, and more vibrant communities (Deakin & Frick, 2009).

The role of lending institutions and corporate demands in this strategy should not be overlooked. It is often a mandatory requirement in a loan document or land sale that sufficient parking be provided to coincide with a tenant. Often, parking areas are specifically dedicated to major tenants in sale and loan documents, even though the field is considered by the local jurisdiction to be "shared" or "joint use". Corporate minimums also tend to exceed local zoning requirements. These minimums are based on national data, worst-case scenarios (including Snowbelt and highly populated areas), and the maxim that no potential customer be turned away.

It is important that sufficient parking be provided; however, not at the expense of unused paved areas the majority of the year, and corresponding heat gain, lack of green space, and separation of land uses. Compact development, especially in down-town areas, is critical to the success of a highly UA. Parking maximums, therefore, play a role in ensuring that thoughtful and considerate deliberations be utilized before designating the parking allotment for a specific use or development.

Examples

Portland, Oregon, has reduced excess parking by placing a cap on the existing parking supply, as was highlighted in Technical Memorandum 1 (Steiner et.al, 2010a). Parking caps, also called maximum parking requirements, reduce the amount of land dedicated to parking (McCahill & Garrick, 2009). San Francisco has instituted a parking maximum based on the maximum percent a building footprint can be used as parking, in order to improve their urban form and to limit the impacts of parking on the transportation system and air quality (Livable City, 2011).

Officials in Zurich (in 1976) and Hamburg (in 1996), Germany, froze the existing parking supply in their respective city centers. When a new off-street space was built, an on-street space was removed so it could be repurposed for other needs, such as widened sidewalks or bicycle lanes. Outside of the zone where the parking cap applies, the City of Zurich only allows developers to build new parking spaces if the surrounding roads can accommodate additional traffic without congestion. Air quality is also taken into consideration. Additional pollution generated from increased traffic cannot reach a level where it violates ambient air quality norms (Langdon, 2011).

Current Application in Project CBDs

At present, the City of Fort Lauderdale has not instituted parking maximums or placed a cap on the amount of parking a user can provide. In the City of Miami, parking maximums are mentioned in Policy TR-1.1.15 of the City of Miami Comprehensive Neighborhood Plan (City of Miami, 2010):

> Policy TR-1.1.15: Through enforcement of minimum and maximum on-site parking limitations, as provided for in Section 14-182 "Transportation Control Measures" of the City Code, the City will manage the downtown parking supply to maintain an appropriate balance among the need to promote economic growth, to facilitate local traffic circulation, and to encourage public transportation use to support the TCEA (Miami, 2010).

While Policy TR-1.1.15 mentions the enforcement of parking maximum limitations, no maximums were found upon review of the Miami 21 code (the City of Miami's form-based code) (City of Miami, 2010 p. 47). According to the City of Miami Planning Department, the parking requirements in this section are still applicable.

Evaluation

A parking maximum policy is appropriate for areas with an oversupply of parking (Everett-Lee, 2001).   An oversupply of parking does not promote vehicle trip reduction goals, and inhibits use of mass transit, especially by choice riders. Parking maximums can decrease the number of trips that are induced from an oversupply of free parking, but the extent of the decrease in car trips is unknown and can vary significantly based upon locality and the policy itself.   This policy does not increase the supply of alternative modes of transportation, but it compliments it. Parking maximums can increase the demand for alternative modes of transportation; as such, this method works well concurrently with increasing the supply of alternative modes of transportation.

This strategy can save developers the cost of providing parking spaces, while achieving community objectives that are consistent with multimodality. Local governments wishing to reduce their supply of parking through parking maximums should do so in conjunction with improvements to other modes of transportation (Steiner et al., 2011a).   Parking maximums, like parking reductions, tend to reduce financial revenue from parking meters and municipal lots/garages; however, these costs could be off-set by increases in ridership on municipal transit systems, and/or by increasing the cost of parking in the spaces provided.

Parking maximums may receive opposition from residents, developers, third party developers, lending institutions and business owners, particularly big box retailers (VTPI 2010c; Nelson, H. personal communication, July 8, 2011). These stakeholders might fear parking shortages and their spillover effects, such as their ability to compete with nearby establishments that provide more parking; therefore, implementation of parking maximums should be done carefully (VTPI 2010e; TRB TCRP, 2003).

Parking maximums are relatively easy to implement in local land development regulations and master plans.   Flexibility, however, should be provided to ensure that desirable uses that demand more parking are not excluded from potentially locating in a downtown area.

Recommendations

Parking supply should be reduced gradually in conjunction with improvements to transit, pedestrian, and bicycle infrastructure (Seggerman and Hendricks (2005). Based on this finding, Fort Lauderdale and Miami should consider implementing parking maximum programs in the downtown areas in conjunction with programs to increase

ridership and accessibility to alternative modes of transportation (see Tables 5 and 6).

An alternative for both cities may be to provide a waiver to justify unusual or unforeseen circumstances, and/or to allow additional parking over the maximum if the parking is also made available to the public (preferably at no cost) in an area underserved by the city. Inconsistencies between plans and related requirements should be addressed through coordination and cross-reference, especially as plans are updated and new parking criteria are created, to ensure accuracy, efficiency and successful implementation. In Miami, incorporation of Section 14-182 into Miami 21 is recommended for coordination and ease of use between codes.

UNBUNDLE PARKING

Description

Parking can be treated as a separate land use by unbundling parking. Unbundled parking works by separating the cost of constructing parking from the cost of providing other space (e.g., commercial, retail or residential) and making it available by purchase or rent. For example, apartments can be rented for $1000 per month with two parking spaces at no extra cost. With unbundled parking, instead of automatically including the parking with each apartment, the apartment could be rented for $850 per month, and renters could purchase or lease parking spaces for $75 each per month.

Unbundled parking promotes a more optimal supply of parking. By separating the cost of parking from a land use, local governments can encourage users to pay for exactly what they need. This policy also promotes efficiency and fairness to occupants who do not own automobiles. Unbundled parking provides consumers who actually utilize a parking space with the true cost of that parking, while allowing those who do not need parking to utilize the saved money in other ways (VTPI, 2010c). On-street parking spillover, however, may occur if residents try to avoid paying for parking spaces. Local officials should regulate nearby on-street parking to avoid this problem (VTPI, 2010c).

Examples

In 2008, San Francisco began to require that parking for multifamily units greater than 10 units be unbundled (San Francisco Municipal Code Sections 167 and 415.7). The ordinance states that parking costs must be separated from housing costs by leasing or purchasing parking separately from housing. For residential complexes with a shortage of parking, parking spaces are prioritized for owners or renters with a higher number of bedrooms (San Francisco Municipal Code, Section 167). Unbundled parking

does not apply to rental housing; however, it is encouraged by the city. The city also allows developers to supply less parking if parking is unbundled from the unit. For example, Symphony Towers apartments were allowed to construct 51 spaces instead of the 141 that were required because of its use of unbundled parking (MTC, 2007).

Unbundled parking has also been used in St. Louis. Although the city does not require unbundled parking, a developer used it as a way to convince lenders that a project would succeed without at least one parking space per unit. The proximity of the site to a public transit station made the project a success. Almost 25 percent of buyers opted out of purchasing an $18,000 parking space (MTC, 2007; MITOD, 2011).

Current Application in Project CBDs

Neither project CBD requires unbundled parking. Miami, however, has instances of nested parking (i.e., Loft 1 and 2) (A. Noriega, personal communication, May 12, 2011). Nested parking is a hybrid between unbundled parking and shared parking, where residents can utilize parking spaces that are shared by commercial uses. A developer negotiated nested parking with the city in 2001. Originally, the MPA did not want the site to have nested parking because unbundled parking is considered a better long turn solution (A. Noriega, personal communication, May 12, 2011). Nevertheless, the developer was able to build three loft high-rise apartment buildings that do not have on-site parking because parking spaces are reserved and leased to residents at nearby municipal parking garages for a discounted rate. The Loft I was the first building in the city without on-site parking (Cutler, 2006). Nested parking areas are provided for the Loft I and Loft II condominium complexes in the College Station garage. The Loft III complex has a first come first serve parking policy. The agreement allowing nested parking seems to be working well. Eventually, the parking rate will go to a market rate (A. Noriega, personal communication, May 12, 2011).

Evaluation

Unbundled parking does not decrease the need to make automobile trips; however, the strategy is a disincentive to provide an oversupply of parking and for tenants to own more parking than they require. Unbundling parking is an important aspect of residential parking management reform because "regulations that require parking as part of new development facilitate automobile demand" (Weinberger et al., 2010). In contrast, unbundled parking can reduce the parking supply by 10-20 percent (Litman, 2006b, p. 14).

This strategy indirectly promotes the use of alternative modes of transportation. The implementation of this strategy also creates social benefits by allowing more affordable housing opportunities and a more optimal supply of parking through market driven demand. The main social benefit of this strategy is in the assistance to low-income tenants who do not own personal automobiles and therefore benefit from unbundled parking. This strategy also promotes a more optimal supply of parking, which can decrease the externalities associated with an oversupply of parking.

Unbundled parking does not generate revenue for the municipality. Developers, however, can use unbundled parking as a way to generate revenue, and building owners can generate revenue by leasing parking as a separate land use. This strategy may potentially generate opposition from residents, if they are required to purchase parking separately from residential units. Developers may perceive the regulation as a competitive disadvantage, but unbundled parking is actually highly desirable because implementation does not require significant costs, and the strategy discourages an oversupply of parking for residential and office land uses. If political acceptance is low, this strategy can be encouraged in the short-term and required in the future. Further, once enabled, it can be used by developers to justify a parking reduction.

Recommendations

As often as possible, parking should be unbundled (Litman, 2011). This land use strategy can be encouraged or required of developers by obligating them to sell or lease parking independently of residences. Communities should encourage developers to unbundle the price of parking through flexible parking requirements that allow reductions for developments with unbundled parking, because when people can save money by having fewer cars, they may make different choices about investing in vehicles (MAPC, 2010).

In buildings where parking is subsidized, unused parking could be cashed-out, providing the cash equivalent to consumers (Litman, 2011). Fort Lauderdale and Miami should formally allow for unbundled parking as a negotiation tool in the land development process in order to allow parking reductions (see Tables 5 and 6). This recommendation will require changes to the land development regulations in both cities.

PARKING EXEMPTIONS

Description

Parking exemptions take a free market approach to providing parking, where the local government allows a developer or business to decide how much parking they want to supply to ensure the success of their project or business. This approach tends to reduce the supply of parking when compared to minimum parking requirements. Exemptions usually only apply to historic districts, downtown areas, areas highly served by transit, and areas near or in close proximity to an existing parking facility. A potential consequence of parking exemptions is a shortage of parking, especially in an area of multiple exemptions that can compound an already existing parking shortage.

Examples

Examples of exemptions from parking requirements in highly urbanized areas are not common. In most municipalities, exemptions exist for overnight accommodations or for 3-hr periods limited to a specific number of days per year. Typically, exemptions only apply to special circumstances, temporary uses, and special events/functions in residential, redevelopment, and historic areas.

Seattle, however, has implemented parking exemptions in the downtown zone, with the exception of Pike Market Mixed Zones, the International District Mixed, International District Residential zones, and parking requirements for restaurants, motion picture theaters, and other entertainment uses. Bicycle parking is also required (City of Seattle Municipal Code, Section 23.49.019). The Seattle CBD has similar employment, residential and household densities to the expanded Miami CBD and the approach may have some applicability in similar areas.

Current Application in Project CBDs

At present, the City of Fort Lauderdale has implemented parking exemptions; essentially, all uses and structures are exempt from the minimum parking requirements in most of the CBD, as exemplified by the following:

Downtown Regional Activity Center. Uses located within the RAC-CC and RAC-AS districts shall be exempt from the parking required as provided in Section 47-20.2. Parking for all other RAC districts shall be required as provided in Table 3, Section 47-20 (Fort Lauderdale, 2011a).

Parking garages are permitted uses only in the City Center District.   Off-street parking facilities are permitted uses in all RAC Districts.   At present, no lands within the Downtown RAC are zoned exclusively for parking; however, a number of parcels in the CBD are currently used for surface parking (ULDR Sec. 47-13).

Several major developments have benefited from these exemptions, including the Hampton Inn, River House condos, and New River Village Condos.   The premise for this exemption is a perception that sufficient parking exists in the CDB to accommodate all users for the foreseeable future.   This premise may change as the city gentrifies and redevelops, especially with more intense and dense uses in the city center, as encouraged by the Comprehensive Plan.   Elsewhere in the city, parking exemptions are a valid alternative, subject to ULDR Sec. 47-20.3. - Parking Reductions and Exemptions (Fort Lauderdale, 2011a).

In Miami, required parking for adaptive reuses may be reduced or exempted by waiver for properties located in a Community Redevelopment Area (CRA), in areas where a parking trust fund has been established, or for historic sites and contributing structures within designated historic districts.

Evaluation

Parking exemptions are much like parking reductions and maximums in that they result in less parking made available by the private sector. This strategy may be consistent with downtown goals; however, there are risks associated with too many exemptions in a confined area within a short period of time, which could potentially result in under-parked areas. Conversely, under-parked areas tend to increase demand for alternative modes of transportation, therefore parking exemptions tend to increase demand for other forms of transportation.   Indeed, parking exemptions are highly desirable in areas served by adequate and accessible alternative modes of transportation.

Parking exemptions, unlike parking reductions and maximums, tend to increase financial revenue from parking meters and municipal lots/garages, primarily because the parking demand is not satisfied by the private sector and must be accommodated by the local government.   This strategy, if correctly administered, is cost efficient; however, corrections to satisfy demand in under-parked/served areas can be costly (e.g., in the form of additional parking/infrastructure to accommodate other forms of transportation).

Parking exemptions, especially as an option, tend to be politically acceptable and welcomed by the private sector.   No known legal issues would prevent a city from

implementing or adopting an exemption program.   A key component of a successful exemption process is continuation of use (or similar use based on the same assumptions).   After a development is built, it is difficult to require additional parking if a use or assumption changes; therefore, it is necessary to ensure that uses, intensity, density, and assumptions remain relatively constant, or take into account new factors as an area evolves and gentrifies.

Another solution to a change in circumstances after a building or project is constructed is to require the developer to indicate, on the initial approved plans, how additional parking can or will be provided in the event that additional parking is required at a later date.

Recommendations

Fort Lauderdale has initiated a parking exemption program in the CBD and has an adequate supply of municipal parking, while Miami should consider the use of parking exemptions in the downtown area (see Tables 5 and 6).   Parking exemptions should apply in built areas with existing structures and insufficient parking. Redevelopment and/or preservation of existing structures should be encouraged; however, the redevelopment of existing structures, or new uses in preserved structures, should not be penalized for insufficient parking and are good candidates for a parking exemption.

Historic districts and areas in close proximity to municipal parking or transit hubs are good candidates for parking exemptions.   An exemption program should be periodically reviewed to ensure adequate access and parking is continually available, especially as additional exemptions are granted. The balance between parking, access and demand must be monitored to ensure deficits are not inadvertently created.

D. COORDINATION OF TRANSPORTATION AND LAND USE

The following section is a review of land use strategies that focuses on the nexus between land use and transportation.   The three strategies – promotion of TOD, incentive for smart growth, and negations for parking requirements – promote more efficient land use and increase the efficacy of transportation systems.

PROMOTION OF TOD

Description

According to Litman (2006a), parking policies should create more accessible land use patterns.   Land use changes that allow for higher-density development, and requirements that promote transit-oriented development and reduce available off-street parking, should always receive the highest considerations in plan and policy development.   Various smart growth reforms like urban growth boundaries and zoning/planning regulations that "encourage construction of public transportation facilities" can help create more efficient, sustainable land use (ITE, 1989, p. 97).   Land use policies are one of the key ways of improving access to transit (Steiner et al., 2011a).

Land use regulations based on the principles of smart growth may produce land use patterns that are more accessible and less automobile-dependent (VTPI, 2010a).   Smart growth strategies also tend to reduce vehicle ownership (per capita) and encourage the use of alternate modes of travel.   This may result in reduced parking requirements and support other parking management strategies (VTPI, 2010a).   The successful implementation of smart growth relies on a coordinated effort from various levels of government (VTPI, 2010g).

The Institute of Transportation Engineers (ITE) has established minimum residential and employment densities required to support transit.   ITE suggests the following:

Higher densities, in the range of 4,500 population/employment per square mile, increase the likelihood of success for transit services.   Residential densities of at least seven dwelling units per acre are considered necessary to economically justify use of local bus routes operating 30 minute headways. As residential density rises to 30 dwelling units per acre, transit use has been found to triple and at 50 units per acre becomes more numerous than auto trips. Likewise, transit ridership increases significantly as employment density

exceeds approximately 50 employees per acre or in activity centers having more than 10,000 jobs. At lower densities, the opportunities for providing transit service in the future should be maintained. Growth management and designs for open space hold great potential for future transit compatible development (ITE 1989, p. 97).

These findings are supported by FDOT, which suggests the densities, shown in Table 10, for the creation of transit supportive developments.

Aside from density to support transit, the land use tool most commonly associated with integrating the principles of coordination between land use and transportation planning is transit-oriented development (TOD). As described by the Center for Transit Oriented Development (2007, p. 6), "transit-oriented development is typically described as a mix of uses or various densities within a half-mile radius, or walking distance, of a transit stop." It often incorporates features to encourage transit ridership and decrease car ridership. This approach to planning has been embraced by a number of cities across the nation as they seek to reinvigorate their urban core.

TABLE 9 - DESIRABLE DENSITIES AND INTENSITIES FOR MULTIMODAL TRANSPORTATION DISTRICTS

Residential Land Use (units per acre)	Commercial Land Use (employees per acre)	Multimodal Potential and Transportation Compatibility
15 +	100 +	High multimodal potential. Densities support light-rail and other high capacity transit service.
7 - 15	60 - 100	Good multimodal potential. Densities support bus transit service.
4 - 7	40 - 60	Marginal multimodal potential, but possibilities for success exist.
1 - 4	1-40	Poor multimodal potential. Densities do not support pedestrian or transit services.

Source: FDOT, 2003

TODs, however, may not be effective at decreasing car usage because many are built with the same amount of parking as conventional development:

TOD developments that do get built are less affordable and less sustainable than they might be, because they are subject to incorrect assumptions about the traffic impact they generate.   Many of the hoped for benefits (i.e., less

time stuck in traffic and lower housing costs), from the nearly $75 billion in public dollars invested in rail transit over the past 11 years, are not being realized (TRB 2008a).

A mix of land uses typically fills voids in the demand for specific services in a defined area (such as an urban living environment, professional office space, retail), or creates the demand for services by providing a unique live/work/play/shop environment that appeals to residents, employers, and visitors. The multi-modal aspect is an integral part of a TOD, and promotes the use of public mass transit (primary), alternative modes of transportation (secondary), and personal vehicles. Another important component of a TOD is interconnectivity between land uses in the project and surrounding area. Goals can often be achieved by utilizing a "Transit Village Vision" approach when conceptualizing a TOD. The following represents a summary of key conclusions regarding TODs:

- Traffic congestion, high parking costs, and system extensiveness are positively correlated with TOD transit ridership;
- TOD transit pass programs, parking reductions, and car-sharing programs encourage transit usage;
- TOD households typically own fewer cars because they have smaller households and because they may forgo extra cars due to transit's proximity; and
- TOD households are almost twice as likely to not own any car and own half the number of cars of other households (TRB, 2008a).

TABLE 10 - TRANSIT DENSITY REQUIREMENTS

Mode	Service Type	Minimum Density (Dwelling Units/Acre)	Area and Location
Dial-a-Bus	Demand response serving general public (not just people with disabilities.	3.5 to 6	Community-wide
"Minimum Service" Local Bus	1/2-mile route spacing, 20 buses per day	4	Neighborhood
"Intermediate Service" Local Bus	1/2-mile route spacing, 40 buses per day	7	Neighborhood
"Frequent Service" Local Bus	1/2-mile route spacing, 120 buses per day	15	Neighborhood

Express Bus – Foot access	Five buses during two-hour peak period	15	Average density over 20-square-mile area within 10 to 15 miles of a large downtown
Express Bus – Auto access	Five to ten buses during two-hour peak period	15	Average density over 20-square-mile tributary area, within 10 to 15 miles of a large downtown
Light Rail	Five minute headways or better during peak hour.	9	Within walking distance of transit line, serving large downtown.
Rapid Transit	Five minute headways or better during peak hour.	12	Within walking distance of transit stations serving large downtown.
Commuter Rail	Twenty trains a day.	1 to 2	Serving very large downtown.

Source: Based on Pushkarev and Zupan, 1977

Public mass transit is usually provided in the form of a commuter, light or heavy rail station in combination with one or more of the following, which can also function as a focal point of the project: bus transfer station; express bus station; downtown circulator (e.g., people mover, trolley system, street/cable car); park-and-ride facility; car sharing/vanpool center; local shuttle service; and taxi stand.

Secondary/alternative modes of transportation are an integral design feature in a TOD and typically include the following: highly visible pedestrian-only pathways; specialized paths for non-motorized vehicles, such as bicycles and carriages; and specialized paths for certain types of motorized vehicles, including golf carts and Segways. Such pathways are usually unobstructed, clearly designated, interconnected, ADA compliant, and provide visual interest and protection from local weather conditions (to the extent possible).

Interconnectivity between land uses in a TOD and the urban fabric of the surrounding area is critical when considering the location and design of a TOD. The intensity/density of development that can be supported by a TOD can disrupt an area if not carefully designed and modeled, especially with regard to traffic patterns, potential congestion, peak hours of use, and parking. Important aspects to consider when formulating plans for a TOD include access, the potential for drivers to use short cuts, and spillover of congestion and parking into neighboring areas. These issues can be addressed, in part, by providing additional primary transit services during hours of peak use or special events. Other methods to address peak hour demand for parking include staggered hours of operation/shifts, and the temporary use of existing remote parking areas and shuttle services during special events and holidays.

Community Planning Act and TOD

Florida's 2011 Community Planning Act (CPA, HB 7207) emphasizes TOD development as a primary objective in local Comprehensive Plans. The following definitions were specifically added to the Florida Statutes to encourage TOD development:

"*Transit-oriented development*" means a project or projects, in areas identified in a local government comprehensive plan, that is or will be served by existing or planned transit service. These designated areas shall be compact, moderate to high density developments, of mixed-use character, interconnected with other land uses, bicycle and pedestrian friendly, and designed to support frequent transit service operating through, collectively or separately, rail, fixed guideway, streetcar, or bus systems on dedicated facilities or available roadway connections.

"*Projects that promote public transportation*" means projects that directly affect the provisions of public transit, including transit terminals, transit lines and routes, separate lanes for the exclusive use of public transit services, transit stops (shelters and stations), office buildings or projects that include fixed-rail or transit terminals as part of the building, and projects which are transit oriented and designed to complement reasonably proximate planned or existing public facilities.

In addition, emphasis in the CPA is placed on Sector Plans and detailed specific area plans. Detailed specific area plans must be consistent with the long-term master plan for a Sector, and must include conditions and commitments that provide for "creating quality communities of a design that promotes travel by multiple transportation modes" (§163.3245(3)(b)8., FS). The CPA also promotes walkable and connected communities by encouraging "compact development and a mix of uses at densities and intensities that will support a range of housing choices and a multimodal transportation system, including pedestrian, bicycle, and transit, if available" (HB 7207).

Most importantly, the CPA exempts public transit facilities from concurrency requirements, and encourages "uses, densities, and intensities of use and urban form that would remediate an existing or planned development pattern in the vicinity that constitutes sprawl or if it provides for an innovative development pattern such as *transit-oriented developments* (emphasis added) or new towns as defined in s. 1521-163.3164., FS" (HB 7207). This exemption, conceivably, could be combined with public or private mixed use development and utilized as an incentive for TOD.

Evaluation

TOD and well balanced mixed use projects (residential *and* nonresidential uses) reduce trip demand and have above average internal capture rates.   The increase in the supply of alternative modes of transportation is a significant functional and design element in a TOD.   Indeed, TODs promote a variety of transportation options intended to capture maximum ridership, and the success of a TOD is highly dependent on providing convenient pedestrian access to various methods of reliable mass transit.

Shoup (2005) explains how the widespread underpricing of parking that exists in most contemporary neighborhoods, even those designed to be transit oriented, contribute to reduced transit quality and a degraded urban environment:

> The lower cost of travel has reduced urban density and the demand for public transit. Reductions in transit service further increase the demand for cars, and the cycle continues. Parking requirements do not cause this cumulative process, but by ensuring that parking remains free, they have exacerbated it (Shoup, 2005).

Underpriced and oversupplied parking make transit less attractive. Hess (2001) identified a positive relationship between parking price and transit use. Infrequent and inaccessible transit fails to reduce automobile trips, leading to increased congestion and demand for parking. This congestion can affect the reliability and efficiency of transit services like buses that share the same lanes with traffic in roadways, thus further discouraging transit use.   These conditions create a self-reinforcing cycle that is closely tied to rising car ownership, decreased urban density, and declining city centers (Shoup, 2005).   The supply of parking affects development patterns and the use of alternative modes of transportation. Appropriately located TOD that meets smart growth criteria can address these conditions.

A successful TOD and/or mixed use project can provide significant revenue in the form of increased tax roll, ridership, and property value.   Private development and/ or public-private partnerships centered on mass transit are generally accepted in most communities.   Political issues and community concerns tend to arise when public lands or concessions are provided.   Most TOD projects, however, require some form of local government involvement.   The approval/permitting process, therefore, should protect public interests, but also promote the form of development desired by the community. The most common method to implement a successful TOD program is to develop a master plan with potential locations and intensity/density considerations.   Prior

conceptual approval of a TOD, along with community involvement, creates incentives for private sector investment, addresses local concerns, and provides transparency.

Fort Lauderdale permits the mix of land uses and TOD in and outside the Downtown RAC. Although policies for transit oriented corridors (TOCs) and TOD are in the Comprehensive Plan, these concepts have not been translated into land development regulations in the ULDR. TOD is not a land use category in the City, and the Comprehensive Plan does not currently designate nodes for future TODs, however, policies in the Comprehensive Plan for the Downtown RAC generally support the principles of TOD. Recognizing the importance of regional transportation planning, Fort Lauderdale has divested its power to implement TOD policy to Broward County. TOC land use designations are implemented after they have been designated in the Broward County Comprehensive Plan Transportation Element or by other planning agencies (Objective 1.42).

Miami specifically addresses TOD as a community goal in the downtown area in Miami 21, a progressive form-based code that has been implemented only recently. TODs are allowed in both Miami-Dade and Broward County. Developments of Regional Impact (DRIs) for transit oriented projects in the cities of Lauderhill and Sunrise have approved development orders and are programmed. Miami-Dade County has constructed TODs in several locations, such as the Overtown, Dadeland South, Dadeland North, and Government Center stations, and in the CBD along the Metrorail stations. MDT is currently exploring opportunities to capitalize on underutilized land owned by the agency for TODs (J. Garcia, personal communication, August 10, 2010), and the City of Miami has designated the Metromover Station in downtown as a TOD.

Off-street parking requirements are a component of outdated city planning, or city planning that emphasizes development practices inspired by the use of private automobiles. These requirements create systemic undesirable results and are unnecessary, often inspiring low-density development outside the central city. Given current market demands, as well as environmental and social necessity, the climate is ripe for the creation of more sustainable regulations that recognize the vital connection between land use and transportation. The overall desirability of well-designed mixed use and TOD projects is high; however, a TOD can increase urban density, which may negatively impact residents who desire to live in lower density urban environments.

Recommendations

Coordination with the County will ensure the promotion of a regional transit system in Fort Lauderdale (see Tables 5 and 6). The city, however, should

aggressively promote the development of transit nodes and accompanying systems within its jurisdictional boundaries. The city should work with the County and FDOT to designate specific transit nodes, hubs and corridors. The designation process should take into account the connectivity of existing transit routes and infrastructure, including the BCT Central Bus Terminal, the Sun Trolley transit service, and the future trolley plan for The Wave.

Upon designation of the transit nodes, the city should devise a regulatory scheme that provides incentives, such as parking reductions and expedited review, to developers and businesses in the identified areas. The Comprehensive Plan suggests that expedited review be undertaken for all projects consistent with approved master plans, including the Downtown Master Plan (Comprehensive Plan Policy 1.16.2, p. 2-14). This policy should be expanded to include projects within TOCs and TODs.

Further, the city should work with the FDOT to focus FDOT funded planning studies and/or grants on TODs in, and leading into, the downtown area. Funding by FDOT is justified because multi-modal nodes based on TOD principals will relieve traffic congestion in the city. TOD is also a primary component of the Community Planning Act. Inevitably, the FDOT will shift focus away from auto dependence and toward projects that support public transportation. As an incentive, the city should consider developing a master plan that clearly indicates the location of potential economic investments in the form of transit-based, multi-modal, higher density, mixed use development.

Temporary parking is also a significant issue in Fort Lauderdale. Undeveloped parcels in the city are utilized to accommodate overflow parking as a "temporary" use. Parking, as a principal use, is not allowed without proper permits and drainage. The parcels currently being utilized for temporary parking are vacant; therefore, parking on them does not qualify as an accessory use. The parking demand satisfied by the temporary use of undeveloped/underutilized properties, however, offsets a real demand for additional parking. The city should discount the viability of temporary parking as a long-term solution when planning for future parking needs.

In Miami, land development principles for TOD are evident; however, incentives to promote TOD are not a predominant aspect of Miami 21. Future amendments to the code should indicate how incentives will be created for TOD, and should include other details on its implementation. It is also difficult to reduce parking supply within the CBD if the demand for parking originates outside the downtown area. As a result, Miami should identify and master plan for specific corridors that would benefit from improved transit access and multimodal linkages to outlying areas. These solutions merit

recognition because the car-access culture that exists in Miami will not change unless the solutions to efficiently moving people around the city becomes less about the emphasis on roadway widening and more about incentivizing TOD and multimodal access. If residents, workers, and visitors to the area cannot get downtown without a car, it is difficult to promote a pedestrian environment, reduced congestion, and facilitate good urban design.

INCENTIVES FOR SMART GROWTH

Description

Various smart growth reforms, like urban growth boundaries and zoning/planning regulations that encourage public transportation, can help create more efficient, sustainable land uses (ITE, 1989, p. 97). Land use policies are one of the keys ways of improving access to transit. Policies based on the principles of smart growth produce land use patterns that are more accessible and less automobile-dependent (VTPI, 2010a). Smart growth strategies also tend to reduce per capita vehicle ownership and encourage the use of alternate travel modes, which can reduce parking requirements and support other parking management strategies (VTPI, 2010a).

Comprehensive plans can also contain principles of smart growth in the form of goals, objectives, and policies that encourage preferred types of developments through the use of incentives that are further supported in local land development regulations. Intergovernmental coordination can be improved through Comprehensive Plans, "which require suitable institutional structures, incentives and education" (VTPI, 2010g). It is also possible for local governments to provide disincentives of a similar nature to developments that are located outside an existing transit service area (Seggerman & Hendricks, 2005). Smart growth should also support development decisions that are predictable, fair and cost effective. This requires collaboration and coordination between stakeholders in the development process (U.S. EPA, 2011).

Building on the principles embodied by smart growth, current discussions about transportation and land use policy focus on location efficiency. Location efficiency refers to development that is designed and managed in order to take advantage of more accessible, multimodal locations with good walking, cycling and public transit (VTPI, 2011d). Government agencies encouraging location efficiency are providing incentives to encourage this type of growth in existing urban service areas, such as infill development, redevelopment, and TOD. Development designed according to these principles can reduce the demand for parking and increase opportunities for economic development in downtown areas.

Typical incentives including reduced development fees (e.g., traffic impact fees), expedited review processes, density bonuses, reduced parking requirements, permit waivers and tax credits, are more fully described in Technical Memorandum 3 (see Steiner et al., 2010c) . Other strategies that complement smart growth incentives and location efficient land development patterns include commercial parking taxes, per-space levies, unbundled parking, parking permit districts, and parking benefit districts, and are more fully detailed in Technical Memorandum 2 (Steiner, Jourdan, Blanco, Mackey, Lisska, Anderson, Hanley, Sucar, Rachmat, 2010b). Parking requirements for location efficient development can be reduced due to reduced automobile ownership and use. In location efficient developments, automobile travel is often 20-50 percent lower, per capita, than in automobile-dependent and urban fringe locations (VTPI, 2011d).

Examples

The Lindbergh Center Station in Atlanta, Georgia, is a "commuter town center", with dense transit-oriented development immediately surrounding the station. The TOD is served by multiple bus routes and functions as a transfer point between the North-South and Northeast rail lines. Lindbergh is also planned as one of the interfaces between the MARTA rail system and the Atlanta BeltLine, and serves as a good example of the type of planned development that should be encouraged in similar communities in South Florida. Lindbergh Center Station is the result of a public/private partnership between MARTA and a master developer, and the site has become a model for TOD across the country by incorporating street-level retail, multifamily housing, office space, and commuter parking in a compact and pedestrian-oriented development.

Another good example is the City of Boulder, Colorado, Transit Village Area Plan. The plan describes the city's vision for the future of a TOD, and was developed to guide long-term development within a specific area. The plan will be executed by the city, private property owners and the Regional Transportation District (RTD). The implementation plan identifies specific actions that are required by the city to advance the plan's goals and objectives, which include reduced dependency on automobiles and shared parking. It is anticipated that the Transit Village Area will evolve into a mixed-use, pedestrian-oriented development where people will have access to multiple regional transit opportunities. The envisioned transit-oriented, mixed-use neighborhood will be predominantly residential, and will include affordable housing for lower and middle income families. Retail and office space that contribute to a pedestrian-friendly environment will also be present. The Boulder CBD has similar employment, residential and household densities as the Fort Lauderdale CBD.

Current Application in Project CBDs

Both Fort Lauderdale and Miami allow a mix of uses in downtown buildings. Fort Lauderdale has a Downtown Master Plan that specifically allows a mix of uses. Miami recently adopted Miami 21, a progressive form-based code that provides specific guidelines and regulations intended to create a vibrant downtown and well-balanced neighborhoods.

MDT recently evaluated whether the Land Use and Transportation Elements of the Miami-Dade County Comprehensive Development Master Plan are supportive of the provision of MDT's transit services. Overall, the plan was found to be consistent with MDT's objectives. The plan requires that all "new development and redevelopment in existing and planned transit corridors and urban centers be planned and designed" to promote TOD, pedestrian friendly environments, transit use, and mixed use (MDT, 2009, p. 8-9). The challenges to transit performance are linked to land use. Serving the CBD is the priority in both municipalities; however, parking should be evaluated as a separate land use in assessing transit feasibility. MDT has the advantage of owning land, giving them more control over land and the power to create TODs.

In Broward County, implementation of TODs has been less successful. TODs were planned at the Sheridan, Deerfield, Cypress Creek, and Boca Raton Tri-Rail stations, but did not materialize because of economic conditions. Smaller scale projects are planned and may become a more common occurrence (E. Zahn & J. Quinty, personal communication, August 9, 2010).

Recommendations

Fort Lauderdale must retain the authority to aggressively promote the development of transit nodes and accompanying systems within its jurisdictional limits (see Tables 5 and 6). The city should work with the county to designate potential transit nodes and corridors. The designation process should take into account the connectivity of existing transit routes and infrastructure, including the BCT Central Bus Terminal, the Sun Trolley transit service, and the future trolley plan for "The Wave." Upon designation of transit nodes and corridors, the city should devise a regulatory scheme that provides incentives, like parking reductions and expedited review, to developers who seek to build in the identified areas. The Comprehensive Plan suggests that expedited review be undertaken for all projects consistent with approved master plans, including the Downtown Master Plan (Comprehensive Plan Policy 1.16.2, p. 2-14). This policy should be expanded to include smart growth and new urbanism principles related to

parking.

Fort Lauderdale should also consider amending its codes to include design policies that further promote connectivity and require inclusion of amenities for transit, walking and bicycling. Transit amenities could be required at developments served by transit, like Planned Unit Developments (PUDs) and TODs. The following examples represent plan policies that incorporate these amenities:

- New developments shall be required to provide multimodal interconnections to adjacent properties to permit travel to neighboring land uses without having to use the public roadway system (Ocala TPO, CUTR 2005).
- Coordinate with local governments to discourage development of strip commercial land use, encourage the control of access in major facilities, encourage mixed-use development, and encourage TOD (Capital Region TPA, CUTR 2005).
- Discourage improvements that support peripheral growth and urban area sprawl (Miami-Dade MPO, CUTR 2005).

Additionally, incentives should be made available to developers willing to embrace TOD, TOC and mixed-use development. Current reduced parking requirements applied to the Downtown RAC could gradually be implemented beyond the Downtown RAC, as space for land decreases and as transit service increases. Tax exemptions could be applied to development that is in close proximity to high levels of transit service. Additionally, more incentives, like the tax incentives mentioned in Technical Memorandum 3 (Steiner et al, 2010b), could further redevelopment and downtown revitalization goals set forth in the Comprehensive Plan.

Miami can enhance its efforts to facilitate TOD within the CBD by establishing parking space maximums. This solution is identified in Policy TR-1.1.15, but not fully specified in Miami 21 (City of Miami, 2010, p. 47). More importantly, Miami must fully embrace its efforts to enhance the pedestrian experience. Special care should be taken to enhance multimodal linkages within and outside of the CBD given the importance of connectivity to TOD objectives. The city should also identify transit nodes and corridors, and devise a regulatory scheme that provides incentives, like parking reductions, to developers who seek to build in the designated areas. Requirements and incentives for TOD and high-density mixed-use development should be considered and implemented. Additional incentives, like the tax incentives mentioned in Technical Memorandum 3 (See Steiner et al, 2010 c), could further the potential of redevelopment goals within the CBD. Finally, tax exemptions applied to development in close proximity

to high levels of transit service would also enhance TOD and the pedestrian environment.

NEGOTIATION OF PARKING REQUIREMENTS

Description

Two of the disadvantages of minimum/maximum parking requirements are that they do not allow for flexibility and they are not context sensitive (US EPA, 2006). Parking policies should be flexible and allow developers to negotiate the cost of providing parking according to the unique circumstance of that development (TRB TCRP, 2003, p. 8-10). Flexible parking management can be implemented through a negotiation process allowed by local land development regulations.

Flexibility can reduce the supply of parking provided by developers in exchange for strategies like the construction of transit stations, in-lieu contributions to a centralized city parking facility, subsidies for transit, or monetary contributions to a transportation management fund (US EPA, 2006; Everett-Lee, 2001). Some cities allow developers to pay a fee in lieu of providing the parking spaces required by zoning ordinances. This revenue is used to finance public parking spaces in place of the private parking spaces the developers would have provided (Shoup, 1999).

Developers can also negotiate for shared parking, dedicated carpool stalls, car-sharing, unbundled parking, multimodal facilities, land banking and pricing strategies (US EPA, 2006). This can be accomplished during the development review process, during which a developer can present a parking study to the city in order to evaluate the specific circumstances of their project. Developments should meet reasonable criteria, such as a specified proximity to transit stations or public parking garages, in order to substitute for parking (Williams & Seggerman 2004). Communities can also promote flexibility by introducing "transferable parking entitlements", which allows projects that require less parking to sell their rights to another user (US EPA 2006, p. 16).

Examples

Land use strategies like parking reductions can be a type of negotiation tool. Land use strategies like unbundled parking, parking reductions and parking policies for alternative modes of transportation can be an example of negotiation.

Current Application in Project CBDs

The Fort Lauderdale CBD does not need a negotiation process because the majority of the downtown qualifies for parking exemptions. For the rest of Fort Lauderdale, the development review process includes a mechanism that allows for negotiation with respect to the provision of parking through the parking reductions procedure outlined in the ULDR.

In Miami, flexibility in the development process is permitted as an integral part of Miami 21.

E*valuation*

The effect of negotiating parking on the frequency of automobile trips is unknown because the affect depends on the strategy that is agreed upon by the city or developer. Strategies that support walking, biking and transit can decrease the need to make automobile trips.

Negotiating parking will encourage an increase in the supply of infrastructure needed for several alternative modes of travel. This strategy serves more as an incentive to supply infrastructure for alternative modes than for supplying parking. The flexibility in negotiation can promote urban design that allows for higher densities. The benefit of negotiation is that it enables developers to be more efficient and innovative, it reduces the amount of land consumed by parking, it allows for better urban design solutions, and it requires fewer parking variances(Shoup, 1999).

One of the disadvantages of negotiation is that it may create a lack of off-street parking, resulting in potential spillover into on-street parking. If in-lieu fees are used as a negotiation tool, the cost to the city of constructing a parking facility can be more expensive because the city may not build or operate the garage as efficiently as the private sector. With in-lieu fees, there can be uncertainty with regards to where the revenue will be used, unless the garage is already built. Most in-lieu fees by cities do not fully recover the cost of providing public parking spaces (Shoup, 1999).

The political acceptability of a negotiation process is high because it favors flexibility for developers, which is not offered by minimum parking requirements. In-lieu fees are legally justified by the nexus between the fees and the cost of providing public parking spaces. The in-lieu option, however, should only be offered when the city is prepared to spend the fee revenue to provide new public parking facilities. A variety of transportation improvements could also be developed to substitute for more parking. Implementing a negotiation process that is done on a case-by-case basis allows for

flexibility, but care should be taken to ensure the process is implemented fairly and uniformly.

This strategy is partly implemented in the general area in Fort Lauderdale through the parking reduction procedures outlined in the ULDR. It may be difficult to implement some strategies, such as substituting bicycle parking for vehicle parking, because of the low rate of bicycle usage in the CBDs. In-lieu fees for centralized parking are highly desirable for both project CBDs. This can be implemented in the short-term.

Recommendations

A shift in parking management has begun in several cities by removing minimum parking requirements in strategic areas, like downtowns, in order to be more context sensitive. Parking maximums, taxed parking, bicycle parking, unbundled parking, incentives, shared parking, parking exemptions, and parking reductions are land use strategies that can be used to reduce the supply of parking. In a metropolitan region, this requires coordination with neighboring cities, since they all share the same transportation system. This results in a gradual decrease of parking spaces to people in the region. The difficulty in transitioning to alternatives policies include opposition from the public, business owners and even banks investors, as they may be less likely to invest in buildings or businesses with less parking because of the perceived loss of access to the building (TRB TCRP, 2003, p. 18-10).

In summary, both Miami and Fort Lauderdale should consider the following recommendations to respond to current concerns regarding parking supply and demand issues, as well as to build upon current efforts to promote transit-oriented development (see Tables 5 and 6):

1)   The requirement that developers provide parking based on general land use type should be excised from local codes. These general requirements fail to reflect the reality of current and future demand. Instead, parking requirements should be negotiated on a project-by-project basis, and shared parking endeavors should be promoted within each CBD.

2)   Minimum parking space requirements should be replaced with parking maximums. In addition, both cities must work actively to monitor issues related to parking supply and demand. A full inventory of private parking spaces will be necessary to fully understand parking supply and needs in each CBD.

3)	Developers should receive incentives in the form of parking credits for providing multimodal infrastructure. In the interest of fairness, this system must be fully specified based upon each city's priorities with respect to all modes of transit.

4)	In Technical Memorandum 2 (Steiner et al, 2010b), the research team recommended the implementation of TDM/TSM strategies to address parking issues in each CBD. These mechanisms should be inserted into each municipality's land development regulations.

5)	Both cities stress the need for the development of a more sustainable land use pattern. While both are currently employing a diverse array of strategies to achieve this goal, future efforts must center on the development of performance measures that help both communities to fully understand whether their efforts are achieving the intended goals.

To ensure a proper supply of parking while promoting flexibility in Fort Lauderdale, the city should allow minimum and maximum parking requirements to be negotiated as a condition of development. Parking exemptions in the downtown area have proved to increase flexibility for developments and businesses. Fort Lauderdale can further increase flexibility by expanding the areas eligible for parking reductions beyond the Downtown RAC. The negotiation process for parking requirements in the downtown could be enhanced by policies that allow for a specific percentage of parking spaces to be substituted by in-lieu fees, bicycle parking, transit service subsidies, monetary contributions toward a centralized public parking fund, land banking, or car sharing programs.

In Miami, city plans and codes should be updated to include policies that allow developers to negotiate and/or substitute required parking spaces for other options, such as in-lieu parking fees that can pay for centralized parking garages or subsidize transit. Off-site parking, land banking, car-sharing and transit subsidies are other policies should be included (EPA, 2006), as should the development of the parking management plan referred to by Miami 21 in Policy 3.9.1. This section of Miami 21 describes the allowances and recommendations for special area plans in Miami.

E.   COORDINATED PARKING POLICIES FOR ALTERNATIVE MODES OF ACCESSIBILITY

Although municipalities provide many alternatives to single-occupancy vehicles, this section only focuses on alternatives currently available, or under discussion, in the project CBDs. Car-sharing, bicycle planning, mass transit as it relates to parking, and park and rides are discussed. Parking for alternative modes of transportation can be implemented in the same way that minimum parking requirements for automobiles are implemented. Depending on the local transportation characteristics, parking spaces for alternative modes like bicycles, scooters and car-sharing can substitute for automobile parking spaces. However, infrastructure for bicycling is usually scarce in inefficient urban transportation systems (Weinberger et al., 2010).

MASS TRANSIT SERVICES

Description

Mass transit and parking is intricately linked. While transit service can influence the demand for parking, other factors, including parking, can influence the demand for transit. According to Puskarev and Zupan (1977), a variety of variables affect transit ridership, including density, land-use mix, pedestrian accessibility, parking supply and price, transit service quality, distance from the CBD, and size of the CBD. The size of the CBD, and distance of any given stop from the CBD, is important due to the radial nature of most public transit systems; therefore, larger CBDs are usually associated with more accessible transit systems. In addition, a larger CBD often means fewer parking spaces per person or job, which decreases the incentive to drive. Free parking is considered a competitor to transit. The cost of monthly parking passes compared to monthly transit can influence a user's mode choice.

A robust transit system can help to reduce the demand for parking by substituting personal automobile trips. Transit agencies often focus on attracting choice riders in order to increase ridership. Ensuring that the user is informed of transit frequency and routes is also an important aspect of transit. Accessible user information can attract choice riders. Actual versus perceived safety is another major factor in whether a user will choose to ride transit. A well designed transit station must take this factor into account. Reliability is also a major factor in whether a user chooses transit. The following four types of transit service currently serve the project CBDs: bus service, shuttle service, downtown circulators and rail.

Bus service is a mass transit service that operates on rubber tired vehicles on

roadways. Bus routes and schedules are generally fixed, although they are subject to occasional changes. Bus service can vary greatly from city to city in terms of their how, and how frequently, they circulate. Bus rapid transit is a form of bus service that has frequent service, designated bus lanes, and few stops. It relies on technology and is designed to expedite service. As a comparison, express bus is a specific type of bus service designed to expedite longer trips by operating over long distances without stopping on freeways or other limited access roadway facilities. Bus service can reduce the need to make automobile trips to and from a CBD, thereby decreasing the demand for parking.

Shuttle service is similar to bus service, but shuttle service uses small buses or vans to provide public mobility. Oftentimes, shuttle service will carry passengers for short trips along busy corridors and provide service to major destinations.

Downtown circulators can be any form of mass transit, such as bus or people mover, which specifically provides transit service to a downtown. Downtown circulators follow a fixed route and circulate in a loop to major destinations. Downtown circulators can also connect to parking structures to allow users to park once in the downtown and use the circulator to get to downtown destinations. This service decreases the need to make vehicle trips within a downtown, and supplements existing transit services that connect to downtown, such as rail and bus. For this reason, downtown circulators can reduce the demand for parking in a downtown.

Rail service can include commuter rail, light rail and heavy rail. The American Public Transit Association (APTA) defines commuter rail as an urban passenger train service for short-distance trips that operate between a central city and adjacent suburbs. Heavy rail transit is defined as high-speed, passenger rail cars that run on fixed rails, which are built on ROWs that is separated from all other vehicular and foot traffic. Light rail transit uses lightweight passenger rail cars on fixed rail, which are built on right-of-way that is commonly integrated with other traffic.

Many elements are necessary for a successful rail project; most are related to increasing accessibility to a CBD that contains a relatively large amount of land devoted to nonresidential activities (Giuliano, 1995). Giuliano suggests that coordination of local land use and transit plans at the local level, and favorable traffic and parking policies, are necessary for a successful rail project. It is important to note that rail can help keep parking outside of downtown areas.

Examples

The San Francisco Municipal Transportation Agency (SFMTA) is a city department that manages all transportation concerns within the City and County of San Francisco. The SFMTA was created by consolidating the San Francisco Municipal Railroad, the Division of Taxis and Accessible Services, and the Division of Parking and Traffic (SFMTA, 2010). Thus, the SFMTA is one of the few transportation entities in the country that controls both transit and parking. The SFMTA transit network consists of local and express buses, light rail, historic streetcar, and cable car routes.

Additionally, Bay Area Rapid Transit (BART) heavy rail and Caltrain commuter rail provide regional connections to the San Francisco CBD. The SFMTA parking supply includes on street parking and off-street facilities in 20 garages and 21 lots (J. Primus, personal communication, September 29, 2010). Approximately half of the garages are located in the CBD, but San Francisco began enforcing strict limits on the expansion of city and CBD parking supply in the 1970s, in order to shift focus to transit-based solutions (J. Primus, personal communication, September 29, 2010). Under city code, developments in the downtown area do not require parking, and only seven percent of the gross floor area of any building may be dedicated to parking facilities (TRB, 2004c, pp. 15-16). Furthermore, the proposed parking scheme must provide a proper mix of parking types (long-term, short-term, and carpool) (TRB, 2004c, pp. 15-16).

Commitment to transit improvement, parking management, and TDM has paid off in San Francisco. Since implementing restrictive CBD parking policies, downtown employment has grown substantially, and the number of trips into the CBD has doubled without the construction of additional parking capacity (J. Primus, personal communication, September 29, 2010). About 60 percent of work-related trips into the CBD are on transit (J. Primus, personal communication, September 29, 2010). Furthermore, transit network enhancements have brought 95 percent of the City and County population within ¼ mile of transit service (J. Primus, personal communication, September 29, 2010). This affords San Francisco a very different outlook on the provision and management of parking, not only in the CBD but the entire City and County.

Overall, San Francisco is on the cutting edge of the coordinated planning of parking and transit. A recipient of an Urban Partnership Program federal grant, San Francisco was the only grantee to allocate funds to parking supply/demand management initiatives (USDOT, 2010). This grant accounts for 80 percent of the funding for SF*park* (J. Primus, personal communication, September 29, 2010). The

SFMTA will observe the SF*park* program until at least the end of 2012, and use those results to shape a citywide parking proposal (J. Primus, personal communication, September 29, 2010). Beyond cruising and supply/demand parking issues, the proposal will address disabled parking, residential parking, and loading zones. An integrated parking plan with city BART stations is also on the agenda, but work has not yet started due to the current focus on SF*park* (J. Primus, personal communication, September 29, 2010). Due to the high densities in the San Francisco CBD, San Francisco is considered a model city for the Miami and Fort Lauderdale CBD.

Seattle, Washington, also provides a noteworthy example of good mass transit coordination. King County Metro Transit (KCMT) and Sound Transit are the primary transit providers in Seattle, Washington. Generally, KCMT runs direct peak-hour express bus service, while Sound Transit operates all-day service with greater variety of modes and greater stop frequency (D. Hull, personal communication, September 1, 2010). A free ride zone exists within the Seattle CBD to make intra-city connections and reduce traffic congestion. This service has drawn criticism as a major revenue sink, but the transit agencies argue that, because many of the free zone riders already have transit passes, the loss of revenue is not substantial (D. Hull, personal communication, September 1, 2010). In addition to the free ride zone, the Seattle Department of Transportation and KCMT jointly operate a 1.3-mile streetcar line that runs between the edge of downtown and a nearby redevelopment district (A. Schwartz & B. Bryant, personal communication, August 23, 2010).

Current application in each CBD

Transit service has been implemented in the CBDs, but its coordination with parking supply at a regional level could be improved. The agencies offering transit service that connect to the CBDs are Broward County Transit, Miami-Dade Transit, the Fort Lauderdale Transit Management Association (TMA), and the South Florida Regional Transportation Authority. Transit service in the Fort Lauderdale CBD is operated and maintained by BCT and the Fort Lauderdale TMA. The Miami CBD has transit service that is operated and maintained by MDT. Miami-Dade County has adopted a Rapid Transit Guideway plan.

South Florida travelers have access to two types of rail, Tri-Rail commuter rail and MetroRail heavy rail service. However, neither directly serves either project CBD. They also have bus service, operated by MDT and BCT, and downtown circulators, known as Sun Trolley and Metromover. Special transit services for people with disabilities are also offered by both BCT and MDT. The Miami and Fort Lauderdale CBDs are served by different types of transit that are operated by different transit

agencies. In the Miami CBD, transit is operated by Miami-Dade Transit (MDT), and transit options include several Metrobus routes, the Metrorail, and the Metromover. MDT provides all public transit service within Miami-Dade County, with the exception of two Express Routes on Interstate-95 that connect to the Miami CBD from Sheridan Street, CB Smith Park, Miramar Town Center and the Broward Boulevard park-and-ride station. Transfers to MDT are possible from the South Florida Regional Transportation Authority Tri-Rail service and Broward County Transit (BCT) buses. The Fort Lauderdale CBD is served by several BCT bus routes, the FL-1 Tri-Rail shuttle, and three Sun Trolley routes. The Tri-Rail shuttle provides free connection from the Fort Lauderdale Tri-Rail station to the Fort Lauderdale CBD. BCT is the primary provider of transit service throughout Broward County, with the exception of their I-95 Express routes, which that connect the Pines Boulevard park-and-ride facilities with the Miami CBD.

Changes to transit routes by BCT are completed based on current ridership. BCT and MDT are primarily funded by their respective counties, FDOT, and the Federal Transit Administration (FTA). BCT's total operating budget for FY 2011 is estimated at nearly $116 million and will remain flat for FY 2012 and into the future.

Fort Lauderdale has plans to implement a streetcar service call "The Wave" in their CBD. Figure 6 shows the proposed streetcar route in yellow. Miami also has plans to implement a rubber tired trolley service that connects Biscayne Blvd. to Brickell (HNTB, 2009).

MDT and BCT have different approaches to prioritizing transit service. The areas they serve vary mainly in that MDT provides more transit service and has higher densities. By looking at the utilization rates of their parking facilities, MDT and South Florida Regional Transportation Authority (SFRTA) explicitly consider parking supply and demand management to be part of their transit system. Still, it is not evident how many parking spaces have shifted outside of the project CBDs due to transit service. On the other hand, BCT has funding and statutory limitations. The agency reacts to county needs within its statutory authority, rather than playing a major role in the planning process or establishing partnership with communities. BCT is making every effort to becoming proactive in this area.

The abundance of parking in the CBD may affect transit ridership levels. Broward County employment centers supply parking to their employees, so there is no incentive for them to use commuter rail or other forms of transit to get to work (J. Quinty, personal communication, August 9, 2010). If there were less parking or more expensive parking, would that cause people to shift to transit, or would employers and businesses shift away from the CBD? With the current policy, we cannot know the

answer to these questions, but they point to the importance of better coordination between transit, parking supply, and land development codes and regulations (E. Zahn & J. Quinty, personal communication).

In Fort Lauderdale, monthly transit passes are more expensive than monthly parking permits, providing a greater incentive to drive to the CBD. The additional cost of time involved in using transit makes transit less convenient and partially explains the lower ridership levels in Fort Lauderdale compared to Miami. Policies that make transit cheaper than monthly parking in the CBDs can help create incentives for transit use and decrease the demand for parking.

The challenges to transit performance in Miami and Fort Lauderdale are intricately linked to land use. MDT incorporates parking as a TDM strategy and has significantly higher ridership levels. MDT also has the advantage of owning land, giving them more control over land and the power to create TODs. The combination of municipalities competing economically, businesses and municipalities wanting to provide ample parking, and several agencies competing for riders and funds has negatively affected transit performance in South Florida. Transit agencies also suffer limitations due to funding. A coordinated parking and transit policy is needed for the region to effectively address transportation needs, and regional transit planning should not be reactive to long-range plans of other government and transit agencies. Additionally, increases in funding could capture more choice riders by creating a dynamic transit system, while improvements to roadway capacity for the personal automobile could counter efforts to increase transit ridership.

FIGURE 6 - PROPOSED TRANSIT ROUTE FOR THE WAVE CIRCULATOR

Source: DDA Fort Lauderdale

Transit Development Plans

The State of Florida Public Transit Block Grant Program, enacted by the Florida Legislature, requires public transit service providers to develop and adopt a Transit Development Plan (TDP). Transit development plans guide the implementation of transit service. The TDP presents the operational and capital improvement needs of the transit agency, and serves as a planning tool to project future needs. A TDP major update is required every five years, and annual TDP updates are required during interim years.

According to the Broward Transit Development Plan for FY 2011, BCT plans to increase service to existing routes while adding new express service from the Sunrise and Weston areas to downtown Fort Lauderdale and Miami. These route improvements have the potential to reduce demand for parking by improving the quality of transit. Fort Lauderdale, through its DDA, is also spearheading a plan to construct a downtown circulator called the Wave (BCT is a sponsor). The Wave is a proposed streetcar

system that is designed to move people around downtown, as well as connect to Tri-Rail. The Wave is perceived to be an economic development stimulator that will have a positive impact on transit.

According to the 2009 Major Update of the Miami-Dade Transit Development Plan, there are no planned service extensions or expansions of the existing Metro Mover system in the planning horizon (MDT, 2009). Ten designated transit hubs are being planned in Miami-Dade County to provide services like transit pass sales, transit schedule information, benches, and shelters. Some of these proposed hubs, like the Dadeland Station, already provide these amenities, while other hubs continue to remain in the conceptual planning phase. The Miami transit hub plan has the potential to improve transit connections through easier transfers and higher quality of service, but the plan does not necessarily displace parking demand from the CBD because it has no parking component.

Evaluation

Whether or not mass transit increases the cost of vehicle-based trips depends on how the service is implemented. For instance, if bus rapid transit uses designated bus lanes that were previously personal automobile lanes, this can increase congestion if the volume of traffic does not decrease. In other words, if BRT is introduced to a transportation system, this can increase the travel time cost for automobiles due to the reduction in automobile lanes. Introducing or increasing the quality of mass transit in an area can create incentives for travelers to use alternative modes of transportation, thereby reducing the demand for automobile trips and parking.

Many factors influence the actual reduction in trips, such as price, reliability, headways, service coverage, comfort, travel time, ease of access, convenience of transfers, user characteristics, and the price of gas. Cost and time are the primary factors influencing a rider's decision to use transit. According to O'Sullivan (2009), users are generally more sensitive to changes in time cost than changes in fare cost. Improvements that reduce travel time to, and waiting time at, transit stops generate larger increases in ridership when compared to lowering fares or decreasing on-board travel time (as cited in O'Sullivan 2009, p. 286).

Kraft and Domencich (1970) found an elasticity response of -0.39 for decreasing walking time and providing more frequent service. In other words a 10 percent increase in line-haul time decreases ridership by about 3.9 percent, and vice versa. For access time, or time spent getting to the transit station, an elasticity of -0.71 is reported (as cited in O'Sullivan 2009, p. 286). Therefore, in addition to parking management strategies, more frequent transit service and more accessible transit stops can be the

most effective way to attract choice riders.

Introducing or enhancing mass transit service promotes the development, expansion and upgrading of infrastructure needed to supply alternative modes of transportation. If planned properly, infrastructure improvements can encourage better coordination between different modes of transportation. What's more, enhancing transit service can justify increases in density and changes to urban form. However, this strategy usually requires a subsidy.

The advantages of mass transit are that it reduces parking demand and vehicle use, improves transportation choice, increases transportation accessibility, and supports sustainability and equity objectives. In some cases, rail transit projects raise property values. However, the benefits diminish as distance increases from the rail line, and there is typically no significant gain in citywide property taxes (McDonald & Osuji, 1995). Successful implementation of mass transit may require new planning, financing and administrative systems (VTPI 2011c).

Mass transit provides a means to raise money, but the ability to generate revenue from mass transit is low. According to Giuliano and Small (1995), most rail projects are unsuccessful public finance ventures from a simple cost-benefit perspective, because actual revenue rarely meets expected revenue, nor does it meet the combined operating costs and fixed costs of laying down track and purchasing trains. The national average for fare-box revenue is 29 percent of operating costs (O'Sullivan 2009, p. 295), and this money is allocated to the same agency that collects fares. Fare-box revenues, however, are not likely to outweigh the direct financial cost of constructing, operating, and maintaining rail. Additionally, revenues can be subject to uncertain changes that can affect the financial sustainability of the strategy in the future.

The political acceptability of mass transit projects is high; however, funding is a major barrier. Collecting revenue in the form of taxes can pose a political challenge, and increasing fares in order to increase revenue is also not ideal and can reduce ridership. Improvements to mass transit can face opposition from car rental companies and taxi companies. Despite challenges in funding, parking supply and demand management is one of the most effective strategies for improving transit performance and ridership. This is because reducing parking supply in order to improve transit can also increase flexibility for development, which is politically favorable.

Recommendations

The lack of coordination between parking policies, transit, and the multiple transit agencies in the region reinforce the importance of better regional coordination of transit services. The lessons learned from San Francisco show that parking and transit can be

managed in one department. For Fort Lauderdale, city transportation organizations (e.g., the DTM, the DFTMA, and the DDA) and the city planning department need to collaborate with regional transit agencies like SFRTA and BCT to effectively coordinate parking and transit (see Tables 5 and 6). For Miami, city transportation organizations (e.g., the MPA and DDA) and the city planning department should collaborate with regional transportation agencies like the SFRTA and MDT to coordinate parking and transit. The supply of parking and currently zoned densities of the project should be evaluated as a separate land use in assessing transit feasibility for projects like The Wave and the proposed trolley in Miami.

It is important for the different mass transit agencies to coordinate in order to find transit solutions for the different market niches. The FDOT should collaborate with BCT, MDT, MPOs, TMAs, and parking authorities, such as the MPO and Fort Lauderdale's DTM, to frame regional parking policies that achieve TDM objectives like increased transit use. Although educating the public about their transit options is important, parking policies throughout the region reinforce the dominance of automobile travel, and may undermine the success of TDM objectives, including transit. Transportation and transit agencies can also do a better job of educating the public and business owners about transit alternatives.

Overall, transit is a key component in achieving a balanced, multimodal transportation system, so it is highly desirable. Adequate transit service can also justify more aggressive supply and demand parking management in the project CBDs. Promoting linkages of parking and public transit supports the "park-once" concept. This concept allows users to park once and move around a downtown area via transit, if stops and services are easily accessible. This eliminates the traveler's need to drive and park at multiple locations in a downtown area, thereby increasing system efficiency. The benefits of reducing congestion, increasing social equity and striving for sustainability are well known.

PARK AND RIDE

Description

Park-and-ride systems are a means of increasing parking supply efficiency by consolidating or making use of underutilized lots, or moving parking demand outside of the CBD's core. Florida Statutes defines a park-and-ride lot as a "transit station stop or a carpool or vanpool waiting area to which patrons may drive private vehicles for parking before gaining access to transit, commuter rail, or heavy rail systems or taking carpool or vanpool vehicles to their destinations" (FS 343.91). The park-and-ride lot has

convenient parking at major transit stations or rideshare stations, and connects the park-and-ride lot to the CBD via shuttle. The major advantage of park-and-rides is that users are directed to parking lots outside of, or on the edge of, the CBD, thereby reducing automobile congestion in the CBD's core.

Park-and-ride systems are typically marketed to long-term parkers through incentives and efficiencies that outweigh the costs of distance (VTPI, 2010). For instance, pricing and time regulations at premium parking locations can be coupled with park-and-ride systems to shift long-term parkers from CBD lots to park-and-ride locations. A reliable and efficient shuttle or public transportation system can also support park-and-ride lots. Cities such as Minneapolis, Houston and Fort Lauderdale have constructed ramps that lead directly from the interstate to the park-and-ride lots, to further encourage park-and-ride utilization (FHWA, 2010c).

Examples

Jacksonville Transportation Authority (JTA) provides mass transit services to Duval County in northeast Florida. The agency offers park-and-ride locations along commuter arterials in the suburbs, and also in the downtown area. Most of the facilities are served by ongoing transit service throughout the day, including local bus, express bus, the Skyway (i.e., elevated people-mover) and the rubber tire Trolley system. In 2009, JTA conducted a study to determine the feasibility of expanding their park-and-ride services to other locations in Jacksonville (JTA, 2012).

Current Application in Project CBD
Several agencies own and manage park-and-ride facilities, which leads to fragmentation of the regional transit system. For instance, the park-and-ride facilities in South Florida are managed by SFRTA, FDOT, MDT, Miami-Dade and other government entities, or are leased from private owners. Table 12 lists the various owners of the Tri-Rail stations in South Florida. BCT does not own or manage any of the parking lots for Tri-Rail, and parking lots at MetroRail Stations are managed by MDT. A variety of agencies provide transit service to the park-and-ride facilities in Broward and Miami Dade County. For instance, BCT and SFRTA provide transit to most of the Tri-Rail Stations in Broward County, while the Sun Trolley, which is operated by the Fort Lauderdale TMA, and the MDT 95 Express provide service to the Fort Lauderdale Tri-Rail station. MDT, SFRTA, and several local communities provide transit service to the Tri-Rail stations in Miami-Dade.

Such a fragmented park-and-ride system in South Florida provides evidence of the need for a coordinated planning effort among all parties involved. A well-

coordinated system would make mass transit and park-and-ride services a more attractive option for travelers. Ideally, travelers should be able to easily traverse the region while seamlessly transferring between services provided by different agencies.

TABLE 11 - TRI-RAIL STATION PARKING FACILITY OWNERSHIP

SFRTA	FDOT	Other Government Entity	Private Owner
Boynton Beach Boca Raton Deerfield Beach (West Lot) Pompano Beach Cypress Creek (West Lot) Fort Lauderdale Airport (East Lot) Metrorail Transfer	Lake Worth Deerfield Beach (East Lot) Cypress Creek (East Lot) Fort Lauderdale Sheridan Street Hollywood Golden Glades Opa-Locka Hialeah Market Miami Airport	West Palm Beach Delray Beach Fort Lauderdale Airport (West Lot)	Mangolia Park

Source: SFRTA, 2010

The SFCS (South Florida Commuter Services) provides regional information regarding alternative ways to commute to work, such as by using carpools, park-and-rides, and transit, and thus supports several TDM strategies. The SFCS's website also includes information and links to the various park-and-ride facilities in St. Lucie, Martin, West Palm Beach, Broward and Miami-Dade counties. The most direct park-and-ride connection to the Fort Lauderdale CBD is the Fort Lauderdale Tri-Rail station, shown in Figure 7. The following five bus routes serve the Fort Lauderdale Tri-Rail Park-and-Ride lot, depicted as the *Fort Lauderdale Station* in Table 12: Tri-Rail Shuttle: FL 1 that connects to the Fort Lauderdale CBD; Broward County Transit Routes: 9, 22 and 81; and Miami-Dade Transit 95 Express

FIGURE 7 - MAP OF FL 1 ROUTE
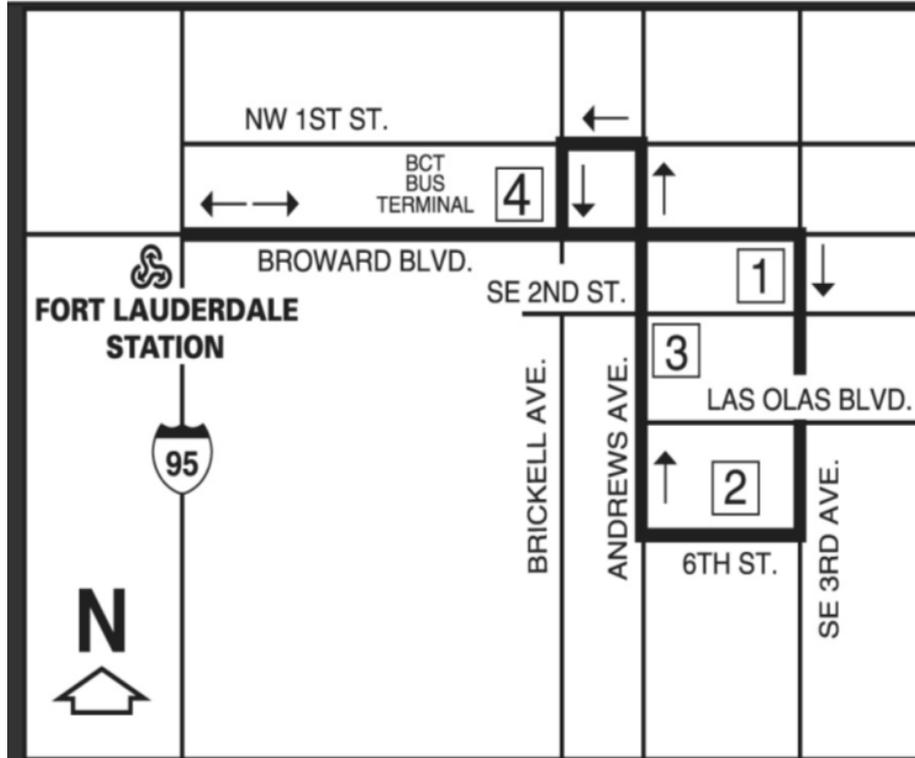
Source: SFRTA, 2010

The Tri-Rail Fort Lauderdale park-and-ride, which connects to the Fort Lauderdale CBD via Broward Boulevard, is experiencing low ridership, perhaps because of its distance from the CBD or the oversupply of parking in the CBD. The high parking utilization rates at several Tri-Rail stations and Metrorail stations suggest that the shortage of parking may negatively affect transit ridership and transit performance.

Park-and-ride lots located at the Fort Lauderdale Airport Tri-Rail station, Broward Boulevard Tri-Rail station, and Commercial Boulevard and Andrews Avenue also serve the Fort Lauderdale CBD. Temporary park-and-ride services are occasionally provided for special events, such as the Air and Sea Show, and Fort Lauderdale offers a limited park-and-ride shuttle service from the downtown municipal parking garage or the Holiday Park at Sunrise Boulevard to the beach area. For this service, parking is typically priced at $5 for the downtown garage and $7 for the Holiday Park. The cost for round-trip shuttle service is an additional $3 per person, and users must have exact change (Broward County Transit, 2011).

Fort Lauderdale, through its DDA, is spearheading a plan to construct a downtown circulator called The Wave (BCT is only a sponsor). The Wave is a proposed streetcar system that is designed to move people around downtown and to connect to

Tri-Rail. It is intended to be an economic development stimulator, and is projected to have a positive impact on transit use in the area. Current plans propose 5-minute headways along the 3-mile route, and the incorporation of park-and-ride stations connecting to the streetcar system (see figure 6).

Most of Miami-Dade County's park-and-ride lots are integrated with the Metrorail, which directly serves the Miami CBD at the Government Center Station (See Figure 8 for a Metrorail Map and Table 13 for a complete list of Miami-Dade County park-and-ride lots).   Park-and-ride parking is free in all Broward and Miami-Dade County Tri-rail station lots, but $4.00 a day, or $10 a month, at Metrorail lots. Technical Memoranda 4 (Steiner, Jourdan, Blanco, Mackey, Hanley, Lisska Shmaltsuyev, Sucar & Rachmat, 2010d) and 5 (Steiner et al., 2011a) include a more detailed discussion and evaluation of the role of park-and-ride facilities.

This strategy directly decreases the demand for car trips to the CBD by providing park-and-ride as alternative mode of transportation, usually at a lower financial cost to the user. Park-and-ride facilities that are served by rapid transit systems can create incentives for travelers to use alternative modes of transportation. Park-and--ride systems may also encourage greater familiarity with the public transit system in general, particularly if public transit is the primary mode of connection between the park-and-ride lot and the CBD (FHWA, 2010c).

Park-and-ride systems increase the supply of alternative modes of transportation for the user by facilitating connections between different modes of transportation, and providing another means to access transit. Drivers, pedestrians and bicyclists can all use park-and-ride lots to access transit service.

FIGURE 8 - METRORAIL MAP

Source: Miami-Dade County, 2011c

TABLE 12 - MIAMI-DADE COUNTY PARK-AND-RIDE LOTS

Miami-Dade County Park-n-Ride Lots

Name	Address	City	Zip Code	Description	# of Parking Spaces
Opa-Locka Tri-Rail Station	480 Ali Baba Blvd.	Opa Locka	33054	Tri-Rail	69
University Metrorail Station	5400 Ponce de Leon	Coral Gables	33124	MetroRail	401
Southland Mall	SW 211th St & 110th Ave.	Cutler Bay	33189	Parking for MDT	Open
Hialeah Market Tri-Rail Station	1200 SE 11th Ave	Hialeah	33010	Tri-Rail	67
Hialeah Metrorail Station	125 E 21st St	Hialeah	33013	MetroRail	321
Okeechobee Metrorail Station	2005 Okeechobee Rd	Hialeah	33010	MetroRail	1,012
Tri-Rail MetroRail Transfer Station	1125 E. 25th Street	Hialeah	33013	Tri-Rail/Metrorail Transfer	39
Homestead Park & Ride Lot	1 Washington Avenue (Busway)	Homestead	33030	Parking for MDT	39
Palmetto Metrorail Station	7701 NW 79th Avenue	Medley	33166	MetroRail	710
120TH St. Park & Ride Lot	SW 120th St & Florida Tpk Homestead Ext.	Miami	33184	Miami-Dade Parking Facilty	28
152nd St. Park & Ride Lot	SW 152nd St & Busway	Miami	33157	Parking for MDT	95
168 St. Park & Ride Lot	9595 SW 168th St	Miami	33157	Parking for MDT	146
Allapattah Metrorail Station	3501 NW 12th Ave	Miami	33125	MetroRail	66
Brownsville Metrorail Station	5200 NW 27th Ave	Miami	33166	MetroRail	423
Coconut Grove Metrorail Station	2780 SW 27th Ave	Miami	33133	MetroRail	204
Coral Reef/Turnpike Park and Ride Lot	SW 152nd St & Florida Tpk Homestead Ext.	Miami	33157	Parking for MDT	92
Culmer Metrorail Station	701 NW 11th Street	Miami	33139	MetroRail	28
Dadeland North Metrorail Station	8300 S. Dixie Hwy	Miami	33143	MetroRail	1,975
Dadeland South Metrorail Station	9150 Dadeland Blvd	Miami	33156	MetroRail	1,260
Douglas Rd Metrorail Station	3100 Douglas Rd	Miami	33134	MetroRail	226
Dr. Martin Luther King Jr. Metrorail Station	6205 NW 27th Ave.	Miami	33147	MetroRail	643
Earlington Heights Metrorail Station	2100 NW 41st Street	Miami	33142	MetroRail	95
Golden Glades	US 441 at I-95	Miami	33169	Miami-Dade Parking Facility	1,036
Hammocks Town Center	SW 104th St & 152nd Ave	Miami	33196	Parking for MDT	Open
Miami Airport Tri-Rail Station	3797 NW 21st St	Miami	33142	Tri-Rail	232
Northside Metrorail Station	3150 NW 79th St	Miami	33122	MetroRail	293
Overtown/Arena Metrorail Station	100 NW 6th St	Miami	33136	MetroRail	36
Quail Roost Park and Ride Lot	SW 186th St & Florida Tpk Homestead Ext.	Miami	33157	Miami-Dade Parking Facility	45
Santa Clara Metrorail Station	2050 NW 12th Ave	Miami	33127	MetroRail	89
South Dade Government Center	SW 214th St & Florida Tpk Homestead Ext.	Miami	33157	Miami-Dade Parking Facility	90
SW 112th Ave Park & Ride Lot	SW 112th Ave & SW 208th Dr	Miami	33180	Parking for MDT	36
SW 244th St Park & Ride Lot	SW 244th St & Busway	Miami	33170	Parking for MDT	94
SW 296th St Park & Ride Lot	SW 296th St & Busway	Miami	33170	Parking for MDT	81
Viscaya Metrorail Station	3201 SW 1st Ave	Miami	33129	MetroRail	93
South Miami Metrorail Station	5949 South Dixie Hwy	South Miami	33143	MetroRail	1,100

Source: South Florida Commuter Service

Evaluation

Park-and-rides benefit users by reducing commuting costs and, in some cases, travel time. Park-and-ride systems also provide many benefits to CBDs. First, park-and-rides can shift long-term parkers to areas outside of the congested CBD, which may reduce traffic congestion within the CBD and create a more pleasing atmosphere for residents, workers and visitors. By shifting long-term parkers to park-and-rides, parking supply located within the CBD is also more likely to be available for customers and deliveries (VTPI 2010a). Finally, park-and-ride systems may provide environmental benefits by decreasing vehicle-miles-of-travel (VMT) and reducing emissions in the downtown (FHWA, 2010c).

Park-and-ride stations can generate money by charging for parking. The price for parking, however, should not be so high that it deters users from using the facility. Revenue generated from parking can be allocated to the same agency that generates or collects it, and that revenue can be earmarked for capital improvements or the maintenance of park-and-ride facilities. However, it is unlikely that this revenue will outweigh the financial cost of constructing and operating the facility.

Recommendations

Park-and-ride facilities can be an attractive option for moving parking to the fringe of the project CBDs (see Tables 5 and 6). When this system is coupled with a robust transit system, such as a downtown circulator, it becomes a more attractive option to users. In Miami, the presence of the MetroMover would enable park-and-ride users to travel around downtown without the use of a car. As a result, Miami-Dade Transit, SFRTA and the Planning Department of Miami should work together to implement a successful park-and-ride system.

Downtown Fort Lauderdale is located a few miles from the nearest Tri-Rail Station, which is located at Broward Boulevard and I-95. The congestion near I-95 makes the successful implementation of a park-and-ride system more difficult. As a part of planning for The Wave, the City of Fort Lauderdale should incorporate access to park-and-ride lots as a consideration in routing the service. Broward County Transit, SFRTA, DTM, Downtown TMA and Fort Lauderdale Planning and Zoning can ensure that the Wave facilitates a successful park-and-ride system in the downtown core.

CAR-SHARING

Description

Car-sharing refers to an hourly automobile rental service that substitutes for

private vehicle ownership and therefore reduces the need for parking. Car-sharing can complement parking policy objectives for CBDs and metropolitan cores by allowing people to get to places outside of the CBD that are not served by transit. Car-share members often use the service for personal business, work-related, recreation, and shopping trips; it is rarely used for commuting purposes (TRB, 2005). The presence of a car-share service typically reduces residential parking requirements by 5 to 10 percent if the car-share is located within one-quarter mile, or by 5 to 10 parking spaces for each car-share vehicle parked in a lot (Litman, 2006b, p. 44).

Examples

Car-sharing exists in several cities including Atlanta, Chicago, Philadelphia, Portland, San Francisco, Seattle and Washington, D.C. (Zipcar, 2011). Atlanta and Seattle are considered peer cities to the expanded Miami CBD because their CBDs have similar population, household and employment densities. Chicago, Philadelphia, San Francisco and Washington, D.C. are considered model cities to Miami and Fort Lauderdale since their CBDs have significantly higher population, household and employment densities.

San Francisco has implemented model requirements for the provision of car-share parking spaces. The requirement applies to newly constructed buildings containing residential uses, or existing buildings being converted to residential uses. Depending on the number of residential units, if parking is provided by these uses, then a specified number of parking spaces must be allocated for car-share at no cost to a certified car-share organization (Table 14) (San Francisco Municipal Code Sec. 166. Car Sharing).

Current application in each CBD

Car-sharing is not available in Fort Lauderdale. In Miami-Dade County, car-sharing is available at the University of Miami and Florida International University campuses, as well as at the Applebaum MRI Center near downtown Miami (Zipcar, 2011; T. Rodrigues, personal communication, January 19, 2012). In June 2012, the MPA officially announced plans to begin a partnership with Car2go in which drivers would be able to rent car and return it to any on-street parking location in the city. As such, the MPA would not need to deal with setting aside parking spaces in city parking lots.

TABLE 13 - REQUIRED CAR-SHARE PARKING SPACES

Number of Residential Units	Number of Required Car-Share Parking Spaces
0 – 49	0
50 – 200	1
201 or more	**2, plus 1 for every 200 dwelling units over 200**
Number of Parking Spaces Provided for Non-Residential Uses or in a Non-Accessory Parking Facility	Number of Required Car-Share Parking Spaces
0 – 24	0
25 – 49	1
50 or more	1, plus 1 for every 50 parking spaces over 50

Source: San Francisco Municipal Code Sec. 166. Car Sharing

Evaluation

This strategy is not intended to increase the cost of vehicle trips, nor does it decrease the need to make automobile trips. Car-sharing reduces the need to own a personal automobile. This strategy does not remove incentives to the use of alternative modes of transportation.

This strategy is not necessarily an alternative mode of transportation, but it supplements alternative modes of transportation by providing users with an option to use the automobile in places where there is no available transit service. This strategy encourages better coordination among alternative modes of transportation. Because this strategy decreases the need to own a personal automobile, it could save users the cost of owning an automobile, or allow two-worker households to own one, rather than two, cars.

A social benefit of this strategy is that it allows travelers who do not own an automobile, or who do not wish to use their personal automobile, to make short trips in an automobile. This strategy can enable CBDs to decrease the supply of parking, and can reduce the automobile ownership rate for downtown residents. One potential cost to the municipality, depending upon its agreement with the car-sharing company and

the market for car-sharing, is the subsidy. If the market for car-sharing is strong, however, this strategy's benefits could outweigh its cost.

This strategy does not provide a means to raise money because the service is typically contracted by private companies. Car-sharing is not considered a politically sensitive topic if the current transportation system is favorable, if it can provide a market for the service, and if car-share parking does not displace public parking in desirable locations. This strategy is compatible with current practices and policies, and works well with parking reductions and parking maximums, assuming that there is a market. Furthermore, the approach is somewhat flexible, although it requires available space for parking and a visible parking location.

This approach does not require the enactment of new laws, since the city, parking authorities, transit agencies, SFRTA, and the counties have the power to enter into contracts. The strategy has not been implemented in the CBDs, although it has been considered by both. The overall desirability of this option require a stronger market in both CBDs, but as densities increase and transit service becomes more available in the region over the long term, the appeal of this option may increase.

Recommendations

A market driven demand for car-sharing has yet to develop in Fort Lauderdale (see Tables 5 and 6). The car-sharing service in Miami should be monitored and built up throughout the region. As car-sharing spreads through South Florida, however, it will most likely become more market feasible in Fort Lauderdale, and it should be especially effective when transit service becomes more robust in the region.

BICYCLE FACILITIES PLANNING

Description

The provision of bicycle parking supports TDM strategies aimed at influencing travel mode choice. Bicycle parking can sometimes replace a portion of automobile parking at various destinations, but this is also influenced by factors like the current state of bicycle infrastructure (Litman, 2006b). While other factors like land use, safety, climate, cultural attitudes and education exert major influence over bicycle use, providing parking for bicycles is a major component of fostering a bicycle friendly environment (Goodridge, 2001). According to the Association of Pedestrian and Bicycle Professionals (APBP), one of the most common problems for bicyclists is the lack of bicycle parking at destinations. Bicycle parking encourages people to bicycle, and it also benefits non-cyclists; business owners benefit from by allowing customers to have better access to their business.

Bicycle racks not only invite cyclists, but they also announce to potential customers that the business supports sustainable values, which is an increasingly important factor for many consumers. Bicycle parking helps promote bicycling as a transportation mode by providing parking opportunities equal to motorized modes. Designated, well-designed bicycle parking promotes a more orderly streetscape, preserves the pedestrian right-of-way, and keeps bicycles from falling over and blocking the sidewalk. In order to foster a bicycle friendly environment, bicycle facilities should be safe, convenient and secure. In addition to bicycle parking, an adequate and safe transportation network is also needed.

Bicycle parking facilities can reduce automobile travel and parking demand. A shift from motorized to non-motorized travel provides additional benefits, including reduced traffic congestion and pollution emissions, and improved public health (Litman, 2006b).

Examples

Seattle has long-term and short-term minimum bicycle parking requirements for commercial, institutional, manufacturing and multifamily land uses (City of Seattle Municipal Code, Section 23.49.019). Seattle allows a reduction of 1 parking space for every four covered bicycle parking spaces provided, to a maximum of five percent of the total parking requirement.

Section 23.54.015 of the Seattle Municipal Code includes a model ordinance for minimum bicycle parking requirements as a part of their parking requirements. Currently, Seattle has a more robust bicycle network than both Fort Lauderdale and Miami. Because of its higher household density, population density and employment density, Seattle is considered a model city to Fort Lauderdale. Seattle is considered a peer city to Miami, however, due to its similar employment density, household density and population density.

San Francisco also has special parking requirements for alternative modes of transportation, such as bicycles, in its downtown districts. For instance, San Francisco requires shower facilities and lockers in all new commercial and industrial buildings, as well as existing buildings undergoing major renovations.

Current Application in Project CBDs

Miami requires 20 off-street bicycle racks per 20 vehicle parking spaces for all T4, T5, T6, CS, CI, CI-HD, and D zones (Miami 21, Article 4. Table 1: Transect Zone

Descriptions). Additionally, the city has developed a bicycle master plan that includes the use of sharrows, bicycle lanes, and shared use paths. The plan (see Figure 9) is broken into three phases for the years 2015, 2020 and 2030.

FIGURE 9 - CITY OF MIAMI 2030 BICYCLE PLAN

Source: HNTB, 2004

Miami has begun efforts towards making its city more bicycle-friendly. An online survey was conducted as part of the outreach efforts for the Miami Bicycle Master Plan. 312 surveys were completed, with the majority of respondents claiming to be advanced bicyclists. Thirty-six percent (36%) of respondents reported they cycle daily, and an additional 36 percent cycle a few times per week. When asked about barriers to cycling, 84 percent listed lack of facilities, and 48 percent listed lack of bicycle parking facilities. The MPA has begun to use some parking meters as bike racks in an effort to use resources and space more efficiently. Bike racks can be found in publicly-owned parking garages of both project CBDs; these are the only weather-protected bicycle racks in the project CBDs. The Miami-Dade MPO currently has a study underway to prepare a bicycle/pedestrian mobility plan for the Miami DDA.

The following represent preliminary recommendations related to bicycle parking:

- Team with local bicycle groups, chambers of commerce and other downtown businesses to install bicycle racks and storage facilities at major commercial and recreational destinations

- Implement high-density bicycle parking improvements
  o Bike corral at Flagler Street and NW Miami Court (NE corner)
  o Bike corral at SW 9th Street and SW 1st Avenue (SE corner)
  o Bike corral at SW 1st Street and SE 3rd Avenue (SW corner)

A study, "Automated Bicycle Rental System and Parking Plan Study", which evaluates the feasibility of bicycle parking facilities in Miami-Dade County, is currently being finalized (D. Henderson, personal communication, October 18, 2011). Additionally, all Miami-Dade County Transit buses are currently equipped with bicycle racks, and the Miami-Dade MPO has a study underway to prepare a bicycle/pedestrian mobility plan for the Miami DDA area (Kimley-Horn and Associates, Inc., 2010).

The Metrorail allows bicycles to be carried on the train with an approved bike permit, and nine Metrorail stations are equipped with bicycle lockers, including the Northside, Government Center, and Vizcaya stations. Broward County Transit's entire bus fleet is also equipped with bicycle racks. Although the Miami code requires one bicycle rack for every 20 vehicle parking spaces for residential, lodging, office, commercial, civic, civil support, and educational uses, during several visits by the research team to the Miami CBD, it was noted that bicycles were parked in places such as parking and road signs.

A new bicycle sharing program called B-cycle was implemented in Fort Lauderdale in December 2011. However, field visits by the research team found limited bicycle infrastructure in place. For instance, there were no bicycle paths or lanes throughout the entire CBD. Furthermore, according to Diana Alarcon, the Director of the DTM for the City of Fort Lauderdale, there is no formal plan for bicycle parking in downtown Fort Lauderdale despite regulations that have been in place since 2007 requiring bicycle parking facilities for new development (D. Alarcon, personal communication, December 14, 2011). Unsurprisingly, stakeholders have described Fort Lauderdale saying, "there is no easy way to bicycle around", and that overall the City is not conducive to attracting new commuters to cycling.

Parking requirements for alternative modes of transportation in the Fort Lauderdale CBD are absent from the ULDR, and the current bicycle network in the CBD is limited because there are no designated bicycle lanes. Goal 3 of the Downtown Master Plan, however, is to make Fort Lauderdale bicycle friendly, which complies with

larger, ongoing proposals for a county-wide bike and trail system.   The following represent action items for this goal:

- Encourage the creation of an integrated network of off-street trail and dedicated on-street bike lanes throughout the RAC.
- Where possible, locate on-street bike lanes along safe, pedestrian-friendly streets with reasonable design speeds.
- Encourage interspersed bicycle facilities throughout downtown at key transit hubs and destinations.
- Design bike lanes with adequate width.

Evaluation

Bicycle parking does not increase the cost of vehicle-based trips or decrease the need to make trips. However, quality bicycle parking facilities can reduce automobile travel and parking demand by promoting a modal shift (Litman, 2006a). Bicycle parking combined with a safe environment for bicyclists can decrease the need to make automobile trips by incentivizing travelers to choose biking. Furthermore, incentivizing a shift from motorized to non-motorized travel provides various benefits including reduced traffic congestion, pollution emissions and improved public health (Litman, 2006a). Improvements that make travel alternatives more convenient and secure, such as the implementation of bicycle parking facilities, are vital to the success of TDM.

Investing in quality bicycle parking facilities promotes the development and expansion of the infrastructure needed to supply alternative modes of transportation. However, this strategy does not necessarily improve the provision of service for alternative transportation, and it does not decrease the costs to providers of implementing alternative modes of transportation.

Bicycle parking facilities benefit society by promoting bicycle use. Social benefits include decreased air pollution and improved public health. Bicycles also utilize less space when compared to personal automobiles; therefore, increased bicycle use can decrease the utilization of precious and finite land resources. Conversely, the social cost of incentivizing bicycle use lies in its potential risk. Biking can be dangerous and life threatening and South Florida has a high rate of bicycle accidents. Bicycle parking facilities run the risk of being underutilized in the project CBDs as a result of undesirable weather patterns and unsafe biking conditions in South Florida. However, from a general perspective, the social benefits of this strategy typically outweigh the social costs. High rates of bicycling is correlated with safer roads due to the concept of safety in numbers (Jacobsen, 2003); as the ratio of bicycle use to automobile use increases, road safety also improves.

This strategy is not intended to generate revenue. As a result, bicycle parking may not always be a financially self-sustainable strategy. Regardless, this strategy is not politically sensitive, and money can be earmarked for maintenance and/or capital improvements. The cost to purchase and install bicycle racks ranges from $150 to $300 each, and the cost to purchase and install bicycle lockers ranges from $1000 to $4000 each. These costs are minimal when compared to the cost of providing automobile parking. Indeed, single-occupancy vehicle (SOV) parking can range from $2,200 to $12,500, depending upon whether the facility offers surface or structured parking. Overall, the cost to develop bicycle parking is significantly less than automobile parking (Pedestrian and Bicycle Information Center, 2007). Municipalities can utilize this strategy as a part of the effort to promote alternative modes and create a more sustainable transportation system.

Municipalities have full governance over bicycle parking policies, and, as a result, this approach does not require a new institutional framework other than the revision of existing land development regulations. This strategy promotes flexibility in development while promoting the use of alternative modes of transportation.

Minimum bicycle parking requirements have been partially implemented by the Miami CBD. While bicycle parking is not a requirement in the Fort Lauderdale CBD, it is allowed if a developer wishes to apply for a parking reduction. Due to the low cost of installing bicycle parking, providing bicycle parking could reduce costs to developers. The low rate of biking and the lack of safe bicycle routes, however, pose the risk of leaving many bike racks underutilized.

Recommendations

Miami should continue its efforts toward making the city more bicycle friendly by moving forward with their bicycle plan and continuing to enforce their minimum bicycle rack requirements (see Tables 5 and 6). Efforts should also continue for bicycle rack requirements in Fort Lauderdale. Increased bicycle infrastructure would help make bicycles a viable form of transportation in the CBD. A study that evaluates the need to adopt a formal bicycle plan for bicycle lanes in downtown Fort Lauderdale should be made to determine areas of greatest need. This study could determine the appropriateness of allowing for the installation of bicycle lockers and shower facilities in-lieu of parking spaces during the Fort Lauderdale land development process.

As part of the development of a bicycle master plan, Fort Lauderdale should incorporate minimum bicycle parking requirements in the ULDR. The land development regulations for both Miami and Fort Lauderdale should provide design guidelines in

order to promote bicycling visibility and safety. Several different styles of bicycle racks exist and not all are suitable for every situation. Racks should be easy to use, attractive, and integrated into the streetscape (VTPI, 2010f). Bicycle parking should be located where it can be conveniently utilized but will not obstruct pedestrian traffic. Visibility allows cyclists to spot the facility as soon as they arrive at their destination, and also discourages theft and vandalism (VTPI, 2010f). These design considerations should be adopted in the Miami and Fort Lauderdale land development regulations. Both cities should promote parking policies that encourage the use of alternatives to the conventional automobile by allowing parking reductions for developments that set aside parking spaces for alternative modes of transportation.

Different requirements should be set in each CBD for short-term and long-term bicycle parking. Short-term parking requires maximum convenience and should be located as close to the destination as possible. Although some short-term bicycle parking should be weather protected, the demand for short-term facilities is highest during dry weather. Stores, banks, and post offices are common examples of short-term destinations. Long-term parking is necessary where bicycles must be stored for several hours at a time, and includes schools, worksites and transportation terminals. Long-term parking facilities should provide showers and clothing lockers for bicycle commuters. If these amenities cannot be provided, the facility should be located as close to a restroom and/or changing room as possible (VTPI, 2010f). Bicycle parking, storage, and shower/changing rooms are collectively called "end-of-trip facilities" (Litman, 2006a). Their provision increases the convenience and security of cycling.

Safe bicycle routes are needed in order to make biking feasible. While the various municipalities in the project CBDs have much control over the planning of their bicycle facilities, the FDOT also has the duty "To establish and maintain bicycle and pedestrian ways" in the state of Florida (FS 334.044). As a result, the FDOT should partner with the project CBDs in planning and establishing a safe and efficient bicycle network. The high rate of bicycle fatalities in Florida signals the need for bicycle education for both drivers and bicyclists. For instance, some schools in the country provide bicycle safety classes to teach children how to properly ride a bicycle; MPOs could coordinate with their respective school board members to establish bicycle education and safety courses.

COMMUTER INCENTIVES FOR ALTERNATIVE MODES

Description

Commuter incentives for using alternative modes of transportation include "parking cash-outs", transit subsidies, and tax benefits. These incentives reward users

for reducing their automobile trips, and may work as a "neutral incentive" in response to the various subsidies that exist for personal automobile use (VTPI, 2011e). In other words, commuter incentives remove the hidden incentive to drive that is provided with un-priced employer-provided parking.

Benefits offered by employers to employees include parking cash-outs and discounted or preferential parking for rideshares (Litman, 2006a). Through these parking demand management strategies, employers can save money by reducing parking demand (Litman, 2006a). Indeed, studies show that when employees are offered the cash equivalent of their "free parking benefit" in order to "cash-out" on their parking spot, they will take the benefit and choose to commute via an alternative mode of transportation (Shoup, 2005; Weinberger et al., 2010). Such strategies can also be useful to employers who are unable to provide adequate parking for all employees (Litman, 2006a).

Some workplaces also offer public transit benefits to employees in order to reduce parking demand. Transit benefits allow commuters to choose a subsidized transit pass in place of a parking subsidy (Litman, 2006b). Several studies argue that ending policies that provide free employee and/or commuter parking and therefore distort traveler mode choice "will have significant beneficial impact on levels of congestion and air pollution" (Calthrop et al., 2000). As part of a well-managed Commute Trip Reduction program, commuter parking benefits "can reduce vehicle trips to a particular worksite by 15-30 percent or more if implemented with regional TDM strategies such as road pricing and major transit improvements" (VTPI, 2010d).

Additionally, the federal government offers a tax benefit program, known as Commuter Benefits, for commuters that travel to work via transit. Commuter Benefits is a federally approved program that allows employees a pre-tax deduction of up to $230 per month in order to pay for transit and vanpool expenses. Municipalities can mandate that companies offer these benefits to their employees.

According to Litman (2011), these incentives "can be implemented in any geographic conditions, although they are most appropriate and effective in areas with significant traffic, parking or pollution problems and sufficient alternative commute options. They are therefore most common in large urban and suburban centers."

Examples

San Francisco's Commuter Benefits Ordinance, which has been in place since January 19, 2009, requires all employers in San Francisco that have 20 or more employees to offer a commuter benefits program (City of San Francisco, 2008). Transit

incentives and demand management initiatives are a hallmark of the SFMTA. To encourage transit usage among commuters, the agency offers a pretax financial incentive to employers, which has proven popular in the City and County (J. Primus, personal communication, September 29, 2010).

The City of Austin's Capital Metro TDM programs include incentives for carpools, vanpools, and transit users, as well as commuter outreach and education. Currently, the agency provides assistance to over 100 vanpools and is conducting a pilot program using vanpools to deliver commuter rail riders to common CBD destinations from the rail terminal (T. Hemingson, personal communication, August 26, 2010). Capital Metro hopes that this effort, combined with the shuttle service, will fill the niche of a downtown circulator. Fare-free transit is currently offered to students and faculty at the University of Texas-Austin and Austin Community College. An attempt to provide fare-free transit to employees of the Whole Foods Corporation was discontinued when the company encountered budgetary challenges; no other similar private company agreements currently exist (T. Hemingson, personal communication, August 26, 2010).

Parking cash-out programs have been used in multiple contexts with reductions ranging from 15% to 39% (Table 15). On average these case studies decreased the demand for parking by 26 percent (VTPI, 2011e).

TABLE 14 - SUMMARY OF PARKING CASH OUT IMPACTS

Location	Scope	Employees Affected	Financial Incentive ($1995/month)	Decreased Parking Demand
Group A: Areas With Little or No Public Transportation				
Century City District, West Los Angeles	3500 employees surveyed at 100+ firms	3,500	$81	15%
Cornell University Ithaca, NY	9000 faculty & staff	9,000	$34	26%
San Fernando Valley, Los Ángeles	1 large employer (850 employees)	850	$37	30%
Bellevue, WA	1 medium-sized firm (430 employees)	430	$54	39%
Group Totals and Weighted Averages		*13,780*	*$47*	*24%*
Group B: Areas With Fair Public Transportation				
Los Angeles Civic Center	10000+ employees at several organizations	10,000	$125	36%
Mid-Wilshire Blvd., Los Angeles	1 mid-size firm	430	$89	38%
Washington, D.C. Suburbs	5500 employees at 3 worksites	5,500	$68	26%
Downtown Los Angeles	5000 employees surveyed at 118 firms	5,000	$126	25%
Group Totals and Weighted Averages		*20,930*	*$110*	*31%*
Group C: Areas With Good Public Transportation				
University of Washington, Seattle, WA	50,000 faculty, staff & students	50,000	$18	24%
Downtown Ottawa, Canada	3500+ government staff	3,500	$72	18%
Group Totals and Weighted Averages		*53,500*	*$22*	*24%*
Overall Totals and Weighted Averages		***88,210***	***$46***	***26%***

Source: MTS 2006

Current application in each CBD

The FDOT regional commuter assistance program, which is managed by SFCS is the leading agency for coordinating and communicating TDM strategies like carpool, vanpool, park and ride, bicycling, and transit information to commuters in the region. The SFCS offers a website and phone assistance, which promote alternatives to commuting alone and have become a major resource for commuter information. For

instance, information regarding alternative modes of transportation such as carpool, vanpool, guaranteed ride home, and park-and-ride lots can be found through their website or their call center (1-800-234-RIDE). They also market to employers directly, and advertise through billboards, print advertisements, direct mail, employer outreach, and tabling at major events. Additionally, major freeway arterials in South Florida often have signs advertising the SFCS call center. Upon user request, the call center can automatically transfer calls to mass transit systems throughout the coverage area, including Broward County Transit (BCT), Tri-Rail, Palm Beach Transit (Palm-Tran), and Miami Dade Transit (MDT) (SFCS, 2011). The use of *street teams* has started this year, with teams of SFCS representatives speaking face to face with businesses and the public in order to encourage the use of alternative modes of transportation.

SFRTA operates an employer discount program (EDP) that offers a 25 percent discount on transit passes sold or distributed to employees. Major participants include American Airlines and the University of Miami. The University of Miami also provides additional transit subsidies for employees and students, and government employees and students are also eligible for discounted fares. Many companies, such as the Memorial Regional Hospital, combine the EDP with services such as privately-run shuttles to and from transit stations. EDP could hurt fare box recovery; however, it has the potential to capture more choice riders (S. Glenn, personal communication, August 6, 2010).

Employers can enroll in a commuter tax benefit program that benefits both employers and employees. This program, which is administered by the federal government, allows employees to deduct up to $230 per month from their paychecks, pre-tax, in order to pay for transit, parking or vanpool expenses. This benefits both the employee and the employer, as employees save by using pre-tax dollars for their commuting expenses and employers get the advantage of reduced payroll taxes. Specifically, employers can save about $100 annually while employees save about $471 (SFCS, 2011). This popular program is relatively easy to add to an employee benefits package and is inexpensive to administer. Furthermore, the pre-tax program may create incentives for additional employer participation. All registered employees that take the bus, train, or vanpool to work are eligible for this benefit, and according to the SFCS website, commuters can save up to 40 percent on their commuting expenses in addition to these tax benefits. Unfortunately, few employers know about or fully understand the program.

The Miami-Dade MPO operates the South Florida Vanpool Program, with support from the Broward and Palm Beach County MPOs. Currently there are 206 vanpools in the region. In the next vanpool marketing campaign, outreach efforts will focus on federal employees and private employees located in Downtown Miami. Efforts

to promote vanpools in the Downtown Fort Lauderdale area will also begin, as Fort Lauderdale has a need for alternative modes of transportation due to a lack of direct rail access (J. Guerra, personal communication, August 23, 2010).

Evaluation

Commuter parking benefits are an effective way to achieve TDM objectives like reduced parking demand, vehicle travel demand, and congestion (Litman, 2006a). The approach creates incentives for travelers to use alternative modes of transportation, and the degree to which the number of car trips is reduced is influenced by the value of the benefits, as well as the quality of available travel alternatives, and traveler demographics. According to VTPI (2011e), trips in urban areas will tend to shift to transit and walking as a result of financial incentives. In suburban areas, financial incentives will shift trips to ridesharing, telecommuting, and biking.

The benefits of commuter incentives include reduced peak-period traffic congestion, reduced parking demand, reductions in crashes, improvements in the environment, increases in demand for alternative travel modes, greater employee satisfaction due to increased tax revenue and cash bonuses, and relief for parking shortages. Furthermore, these benefits increase affordability for transportation, and promote social equity for employees who use alternative modes (VTPI, 2011e).

The costs associated with commuter incentives include the financial cost of the benefits and administrative expenses, minus parking cost savings. Administrative costs tend to be small once the program is established and incorporated into the payroll system. A typical Parking Cash Out program requires approximately two minutes per employee per month for administration (Shoup, 1997). Firms that own employee parking facilities may incur financial costs if they pay financial incentives but are unable to lease or sell excess parking capacity or use the land in other profitable ways. Shoup (1997) found that this resulted in a $2 per month average net cost per employee among eight employers studied (as cited in VTPI, 2011e).

The commuter incentives strategy does not provide a means to raise revenue. This strategy decreases revenue generation though administrative costs and the cost of the benefits. A potential political problem with commuter incentives is the risk of abuse. For example, it may be possible for employees to claim that they commute by alternative modes while actually driving and using off-site parking spaces, which creates spillover parking problems (VTPI, 2011e). "Many businesses are unfamiliar with Commute Trip Reduction and Financial Incentives. There are often administrative barriers to providing such benefits or resistance from employees and labor organizations to some types of incentives" (Rankin, 1995). Some businesses may hesitate to use commuter incentive strategies because of questions related to short-

term financial savings from reduced automobile use, especially if the business has sufficient parking capacity. Surveys indicate that about 60 percent of employers own their own parking facilities, and 37 percent receive parking bundled with building leases (Kuzmyak, Weinberger and Levinson, 2003). Furthermore, local governments may be unwilling to reduce parking requirements in response to such programs, and developers may be afraid to reduce parking supply when constructing buildings. Additionally, income tax laws favor parking subsidies over other employee benefits (VTPI, 2011e).

The strategy is easy to explain to employees and employers, although it may require some education. Current state and municipal legislation allows for commuter benefits to be considered as TDM strategy. The approach may require a new institutional framework between the SFCS, employers and municipalities if municipalities wish to mandate commuter benefits. The strategy is compatible with current practice and policies because commuters may already be paying for parking. The parking cash-out strategy works best with unbundled parking (VTPI, 2011e). This strategy may also be incompatible with minimum parking requirements because it may lead to underutilized parking. However, the benefits of this program can outweigh the cost of implementation, administration and losses in tax revenue due to the benefits of reduced parking demand, reduced congestion, environmental benefits, and the increase of travel options for commuters.

Recommendations

While business associations and individual businesses are able to implement this strategy independently, many may not be aware of the tax benefits that are currently available (see Tables 5 and 6). As a result, the SFCS should continue their efforts to target major employers for enrollment in commuter benefit programs. Because commuter incentives are highly applicable in both project CBDs, each city should enact municipal codes that mandate commuter benefits similar to San Francisco. Miami and Fort Lauderdale could modify their land development regulations to allow developers to reduce their parking supply in exchange for this the use of this strategy.

REGULATION OF PARKING PROVIDERS

Taxation and in-lieu fees are discussed in this section as means of regulating the operation of parking providers. Tax policies can be implemented as a land use strategy or a regulation in order to discourage excessive supply of parking by decreasing the demand (Everett-Lee, 2001). Two common tax policies are commercial parking taxes and per-space levies. In-lieu fees do not limit parking provider operations in the same manner as taxation. Instead, they allow parking providers to opt out of parking provisions, much like cash-out allows drivers to opt out of a parking spot.

TAXES TO COMMERCIAL PARKING

Description

Parking is a highly valued resource in CBDs where the cost of land is great. Competing jurisdictions sometimes use ample parking as a means of encouraging development in their location. An oversupply of parking, however, distorts the urban transport and land markets, and also prevents efficient use of land. Tax reforms can help offset this problem by reducing demand for parking and providing a tax that increases transportation system efficiency through changes to other modes of travel and reduced cruising for parking. Two main types of parking tax reforms include commercial parking taxes and per-space parking levies. A commercial parking tax is a regulation that is collected in the form of a percentage of a parking fee, and is paid by the user (Litman, 2006a). The policy reduces the demand for parking by indirectly increasing its cost, which encourages the use of other modes of transportation (Litman, 2006a; Everett-Lee, 2001). This tax applies primarily to privately owned facilities in downtowns (VTPI, 2010b). Per-space levies give businesses an incentive to reduce parking supply (Litman, 2006a). Implementation of these strategies requires commercial parking operators to maintain reliable transaction and revenue records. In order to avoid the underreporting of revenues, operators can be required to issue receipts.

Taxing commercial parking could not only be a tool to increase public revenues, but also a way to regulate the total supply of parking. Usually, the tax is based on transactions or revenues. Litman (2010) states that parking taxes are "fairly common and relatively easy to implement", but they tend "to reduce the supply of priced (user paid) parking" and they may reduce total parking in areas where a significant portion of parking is provides by commercial operators, and by making free parking more attractive to users [they] may encourage more parking to be unpriced" (p. 3). If parking is correctly priced, the tax should not considerably affect the commercial operator's

revenue because of its inelastic nature. In areas with abundant supply where parkers are more responsive to price, the opposite could be the case, and this may leave the operator with a loss in revenue (TRB, 2005).

Commercial operators "tend to be more accepting of a parking tax if governments are already maximizing income from other parking related revenue sources, such as meters and enforcement of parking regulators"; therefore, before imposing parking taxes, "local governments should increase their own parking prices" (Litman, 2006a, p. 158). Litman (2010) suggests that equity comes into play with this strategy. He found that a wide tax base (i.e., taxing parking in the largest area possible) is ideal in that it does not disadvantage any specific demographic group. Before taxes are increased, municipalities should ensure that current public parking prices are set to the market rate. If taxes are implemented, Litman (2010) suggests requiring operators to pass the cost on to motorists instead of absorbing it themselves. Litman (2010) also suggests charging a tax or fee for land uses that require curb cuts, as they represent a loss in revenue from on-street parking spaces.

Changes to parking tax policy can support TDM objectives by discouraging the construction of excess parking supply (Litman, 2006a). The tax can serve as a user fee and generate revenue for the government. Taxing the use of parking facilities provides an appropriate source of revenue for local governments to use in financing improvements to local transport services (Litman, 2011).

Examples

Parking taxes can also be used as a TDM strategy. In San Francisco, the municipal government instituted a 25 percent tax on all commercial parking transactions. This tax was imposed on all garages and lots in the city with the purpose of creating a disincentive for automobile commuting (J. Primus, personal communication, September 29, 2010). The tax generates fifty million dollars annually, and that figure is expected to increase as improvements and additions are made to the revenue control system (Litman, 2006a). Similarly, in 1995, Cleveland, Ohio, instituted an eight percent parking tax to raise funds for the purposes of building a new football stadium (Litman, 2006a). Table 16 shows the tax rates and the basis on which they are calculated in various cities.

Current Application in Project CBDs

This strategy is not being implemented in Fort Lauderdale and has limited potential without a change in state law. Florida Statutes §166.271, requires a population of 200,000 to impose a surcharge on municipal facility parking. If the city

desires to change state law, the surcharge on transactions has significant revenue potential given that commercial operators supply nearly three quarters of all parking spaces in the city. Taxes on commercial parking can increase public revenue and also be a tool to regulate parking supply. Miami currently imposes a parking tax on all commercial, non-residential, and off-street parking provided by both private and public entities. The tax is 15 percent of the amount charged for parking per transaction. Revenue from the tax is used for projects such as traffic calming and street paving. The Miami DDA has found no decline in business activity or increase in vacancies due to this tax (Berk & Associates 2002 as cited in Litman, 2010). However, commercial parking operators, except those in the wealthiest business districts, indicated that the surcharge had a significant negative impact on operating income and that they had had to absorb more of the tax … apparently due to the high supply of parking in downtown Miami (Litman, 2010)..

TABLE 15 - PARKING TAXES IN VARIOUS CITIES

City	Parking Tax
Bainbridge Island, WA	12% of revenues on both public and private parking facilities
Bremerton, WA	6% of commercial operator revenues
Burien and SeaTac, WA	$1 per parking transaction; exemptions for people with disabilities, government vehicles, and carpools
Baltimore, MD	$14 flat fee on monthly parking transactions; 11% on daily and weekly parking
Detroit, MI	30% tax on airport commercial parking
Los Angeles, CA	10% of parking revenues
Miami, FL	15% of revenues
New York, NY	18.5%, or 10.5% for Manhattan residents
Oakland, CA	10% of revenues
New Orleans, LA	12% of revenues
Pittsburgh, PA	41% of revenues – highest in US
Santa Monica, CA	10% of revenues

Source: Litman, 2006a, p. 159

Note: The original table from the Litman text had a parking tax value of 27.8% for Miami. It does not specify if it is 27.8% of total revenue or of MPA revenue. (Litman, 2011, p. 4). The source of the information contained in the original table by Litman is not clear. As it was reported in Miami, the commercial tax is 15% of revenues.

Two out of three parking spaces in the Miami CBD are supplied by the private sector. This makes a parking tax a very important source of revenue. Miami adopted Ordinance Number 12563 on July 22, 2004, which lowered the parking tax rate from 20 percent to 15 percent. The ordinance was "intended to impose and levy a surcharge on the sale, lease or rental of space at parking facilities in the city at the rate of 15 percent of the revenues derived from any fee, charge or exchange for the parking of a motor vehicle in or on any parking facility in the city for which a fee, charge or exchange is made on an hourly, daily, weekly, monthly, yearly, event, validation programs, valet or any other basis" (City of Miami, 2011, Chapter 35 Article IX). The MPA also pays the 15 percent tax (A. Noriega, personal communication, October 27, 2010). In the last 10 years, this tax policy has generated revenues of more than $100 million in the downtown area. Collected revenue is deposited in Miami's general fund, to be used for fiscal provisions of the annual budgeting process (A. Argudin, personal communication, October 22, 2010).

Lesser intensity[1] use operators in Miami do not pay the tax, which means that controlling or formalizing lesser intensity spaces could create additional revenue. In addition, Miami's tax rate is considerably lower than in peer cities, such as San Francisco (25 percent); this suggests that an increase in the rate for commercial parking may be feasible.

Evaluation

Commercial parking taxes have the effect of decreasing the demand for parking (and automobile trips) by increasing the cost to the user. This acts as a disincentive to driving, but does not decrease the need to make automobile trips. Commercial tax parking may not treat everybody equally, since the tax is not progressive with respect to income. As a result, the tax can be overly burdensome to lower income individuals,, and therefore does not benefit the transport disadvantaged. Furthermore, this tax has no effect on improving basic mobility (VTPI, 2011f).

Taxing commercial parking increases the cost of vehicle-based trips, which creates a disincentive to drive; it encourages travelers to use alternative modes of transportation and may decrease the use of parking. However, this strategy does not decrease or subsidize the user cost of alternative transportation.

Taxing commercial parking does not directly promote the development of alternative modes of transportation or the financial support of these modes. It also does

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[1] The term given to parking facilities that appears to be informal in nature but is allowed by zoning regulations. These facilities usually wax and wane in accordance to demand (e.g., event parking)

not encourage better coordination with other modes of travel nor decrease the cost of providing alternative modes of transportation. Additionally, it does not affect the factors that can increase the availability of alternative modes of transportation.

This strategy has TDM and revenue-generating social benefits. The only social cost is higher taxation, which is passed onto automobile users who park in the downtown. Increasing the cost of parking may raise equity issues, especially if alternative transportation options are limited in the area where the tax is being applied. If the tax revenue is reinvested into the transportation system, the social benefits may outweigh the social costs because the persons who use the parking pay the tax but community as a whole benefits.

Taxing commercial parking provides a means for municipalities to raise money. The monies are not usually allocated to the same organization that collects them. Instead, the funds are usually applied to the general fund. However, a municipality could allocate these funds to pay for the capital and recurring costs of transit facilities, or to a benefit district. This strategy is self-sustainable because it is not expensive to implement or to collect the tax revenue. However, this strategy is affected by parking demand; if demand for parking decreases, then there will be less revenue collected through taxation.

The approach is politically sensitive, as all taxes tend to be. An educational and marketing program would be useful for stakeholders that perceive this strategy to have a negative effect on their interests. Without an education policy, stakeholders may try to block this strategy because it increases the price to park in the CBD. In order to effectively implement new taxation regulations, this policy may require new framework and laws. However, this strategy is legally robust and would be permitted under State legislation. The strategy has the flexibility to be applied to different situations, and it is compatible with current practices and policies that are in place.

This strategy is generally desirable as it has both TDM and revenue generating benefits. Currently, only Miami is taxing both public and private parking, but this strategy is highly desirable, but not legal, for Fort Lauderdale since they are currently not taxing commercial parking.

Recommendations

One action that both cities might take is to incentivize the development of vacant properties that are currently being used, formally or as a "lesser intensity", for surface parking. Miami has already upgraded the zoning on similar properties to commercial

111

use, and it is recommended that Fort Lauderdale do the same (see Tables 5 and 6). Additionally, Miami should determine the reason that current regulations permit the use of vacant properties for surface parking. One reason might be that tax exemptions are granted by the Tax Board of Appeals to the owners of these properties, who have been successful at convincing the Board that these properties have no demand. Properties with low taxation or no taxation provide no incentive for redevelopment. In the long-term, this strategy has TDM and revenue-generating benefits that work with existing strategies. It is also recommended that Miami investigate additional ways to apply parking taxes in order to manage the overall parking supply.

COLLECTION OF TAXES AND FEES

Description

Per space levies are special taxes that are similar to general property taxes but are only applied to parking facilities. Per space levies are based upon the number of parking spaces or the square footage of land dedicated to parking (VTPI, 2010a), and can be implemented like an impact fee. These taxes support TDM objectives more effectively than commercial taxes by discouraging an oversupply of parking. Per space levies also increase property taxes on underutilized land, such as expansive parking lots, which can encourage redevelopment. Levies imposed on un-priced parking can also encourage property owners to price parking (Litman, 2011). Parking space levies can be applied to all privately owned, non-residential, off-street parking within the CBD, and different rates can be designated for short-term and long-term use facilities. The levies require a parking space inventory, but this can be incorporated into general property tax records.

Parking impact fees and parking in-lieu fees are a common development tool used to compensate the community for the impact development will have on its surroundings. For developments, parking impact fees have the same goal as in-lieu parking fees – providing parking in a centralized location that is located near, but not as a part, of the development. Public parking in-lieu fees give developers the option to pay an in-lieu fee instead of providing the required parking spaces. Shoup (2005) explains that impact and in-lieu fees provide several benefits, including the following: the system creates flexibility for developers; it allows for shared parking among different uses whose use peak at different times; it creates convenience by enabling customers to park once in order to access different, nearby locations; it encourages historic preservation by providing an alternative to on-site parking requirements in areas where it is difficult to provide parking on-site; it promotes compact patterns of development due to the consolidation of parking; it requires fewer variances in planning requirements

requested by developers; and it results in better urban design.

Shoup (2005) also cites some concerns related to parking impact and in-lieu fees, such as the resulting lack of on-site parking, high fees, no guarantees for parking provision, and fewer parking spaces. However, well designed impact and in-lieu fees can overcome these difficulties. According to Shoup (2005), the average in-lieu fee per space is $11,197 for cities where the average parking requirement is 2.8 spaces per 1,000 square feet. The only Florida city in Shoup's sample was Orlando, where the average fee was $9,883 and the parking requirement was two spaces per square foot.

Examples

Downtown Orlando has imposed a fee of $1,500 for each residential parking space that exceeds the parking maximum regulation. Non-residential uses east of Interstate 4 are also charged $1,500 per parking space that exceeds the parking maximum regulation (City of Orlando, 2011).

San Francisco has begun a study to determine whether the city should adopt new parking fees in order to offset the impact that new parking facilities and residential development has on the transportation network, and to promote transit oriented neighborhood plans. The maximum amount the city may be allowed to charge for the parking impact fee is $5.00 per square foot of floor area dedicated to parking (City of San Francisco, 2011).

Sydney, Australia imposes an annual parking space levy of AU$800 (about $800 US) on nonresidential landowners in their CBD; the revenue is used to fund transportation facilities. The tax raises more than AU$40 million annually, which is allocated to capital expenses on transportation projects (Litman 2010).

According to Litman (2006a), an in-lieu program was established in Coconut Grove (a neighborhood in the City of Miami) in 1993. The fee is a one-time payment of $10,000, or monthly payments of $50. This policy has generated $3 million in revenues from 938 spaces (Litman, 2006a), which has been used for the construction of a 416-space parking structure and for other transportation-related investments.

Lake Forest, a suburb of Chicago, Illinois, has implemented in-lieu fees of $22,000 per space, which is considered highly effective by developers and public officials at managing parking in downtown, given the scarcity of land. Jackson, Wyoming adopted a similar policy in 1994, and revenues are exclusively dedicated to increasing parking supply (Litman, 2006a).

In Montgomery County, Maryland, in-lieu fees are used much like property taxes. The County has four parking districts, and each district collects a 0.28 percent surcharge on the annual property tax rate. All properties that are within the parking districts are subject to the surcharge, but if a property has minimum parking that is required by the land development regulations, the owner can apply for exemption from the fee. This method allows Montgomery County to enforce retroactive parking requirements. The collected revenues are used to fund public parking facilities (Shoup, 2005).

Current Application in Project CBDs

Neither Fort Lauderdale nor Miami is currently implementing per-space levies or in-lieu fee strategies in their downtowns Although in-lieu fees are in use in the Miami neighborhood of Coconut Grove, they are not currently being used in the downtown area.

Evaluation

Per-space levies are intended to discourage an oversupply of parking, and have the effect of decreasing the pressure to supply parking, The per-space levy does increase the cost of vehicle-based trips, assuming that the provider cost is passed on to the consumer. It does not, however, decrease the need to make trips.

Per-space levies do not increase the supply of alternative modes of transportation, but they can provide a means of financially supporting alternative modes of transportation if revenue is earmarked for improvements to alternative modes. This strategy, however, does not directly subsidize or decrease the prices of alternative modes of transportation. In-lieu fees allow developers to omit on-site parking, which may require automobile parkers to walk farther from parking to their destination, and may decrease the desire for travelers to make trips. In-lieu fees are an applied cost to the parking provider, and they may increase the cost of automobile based trips if they are passed on to the user. The same can be said of per-space levies: they do not directly affect the cost of automobile use unless the parking provider wishes to pass the cost along to the parking user. It is unlikely that the costs associated with either per-space levies or in-lieu fees would be enough to deter drivers from making automobile-based trips.

Per-space levies do not promote the development or expansion of transit infrastructure or regular services nor do they encourage coordination of alternative

modes of transportation or subsidize the cost of providing such services. They also do not affect factors that can improve the provision of transit. Nonetheless, while in-lieu fees do not promote the supply of alternative modes of transportation, they do support compact land development, as conglomerated parking is used for other purposes, and allow developers to use the entire lot for development, rather than having to provide parking.

The primary benefit of a per-space levy is that it results in a more efficient use of land by parking providers through centralized parking supply and management. Additionally, per-space levies also decrease the oversupply of parking. Compact parking facilities open more land for development, which is especially important in a dense urban core, and provide for a more pedestrian-friendly environment. There are limited social costs to this strategy. Although per-space levies increase development costs, which can be burdensome in times of poor economic conditions, overall, the social benefits outweigh the social costs for this strategy. Per-space levies, like most taxation schemes, have net positive social impacts.

Both per-space levies and in-lieu fees increase property taxes for underutilized land, which can encourage redevelopment. Per-space levies and in-lieu fees can also be used as a means to generate revenue for a municipality. Revenues can be allocated to the general fund, capital improvement of parking, or transit services, depending upon the municipality's priorities. Per-space levies do not explicitly prescribe what should be done with collected funds; that is left up to the municipality. However, revenues from in-lieu fees should only be used to pay for capital and recurring costs associated with public parking facilities. Generally, these strategies are financially self-sustaining unless technological costs are high, or if the demand for parking decreases substantially.

Per-space levies are a form of taxation, and taxes can be a politically sensitive issue. However, it seems unlikely that this strategy would result in public opposition because costs could easily be passed onto the user if that is desired by the parking provider. Rate regulation can also be politically sensitive because the manipulation of parking rates is sometimes unpopular. In-lieu fees, however, should not garner any negative feedback, and it is unlikely that stakeholders would have a problem with their implementation. All of these strategies are relatively clear and do not require public education. Additionally, they do not require a new institutional framework or new laws. Furthermore, state legislation does not prohibit the use of any of these strategies, which makes them legally robust. The way that the strategy is set up would determine which functional agency would govern it. Revenues would probably stay with the collecting agency for rate regulation and in-lieu fees, but funds collected from per-space levies would most likely be allocated to a general fund, as is the case with most tax schemes.

These strategies are not currently being implemented in either Miami or Fort Lauderdale. The three strategies have beneficial TDM and revenue generating implications, which makes them highly desirable for implementation in both cities.

Recommendations

Although they may not be politically favorable during the current economic climate, in the long term both cities should consider imposing per-space levies (see Tables 5 and 6). Imposing per-space levies will require changes to land development regulations. It is also recommended that both Miami and Fort Lauderdale undertake further studies to assess the necessity of implementing impact fees. This study is needed in order to determine the monetary impact of parking supply on the transportation system before implementing an impact fee.

F.   DESIGN AND TECHNOLOGY

Design and technology are strongly linked to TSM. TSM is a set of strategies that are implemented "to improve the efficiency of the transportation system through operational improvements" (FDOT 2005). These strategies are supply-side oriented and include efforts such as traffic signal synchronization, wayfinding signage and the use of Intelligent Transportation System (ITS) technologies. For the purposes of this report, the following two types of TSM strategies are analyzed in light of best practices, current efforts in Fort Lauderdale and Miami, and their potential for future use in Fort Lauderdale and Miami: 1) collection methods and 2) sensors/real-time data.

SIGNAGE AND WAYFINDING

Description

The term wayfinding was invented by Kevin Lynch in 1960. His definition of wayfinding was used to describe a collection of "maps, street numbers, directional signs and other things". Wayfinding systems are meant to be comprehensive navigational systems; they do not simply refer to signage (Muhlhausen, n.d.). A holistic system may include signs, maps, electronic devices, and other information resources that help orient visitors.

The primary purpose of a wayfinding system is to provide users with information; the location of parking facilities is one of the many pieces of information that can be provided using these systems. When travelers are properly informed of their options, they can make educated decisions about their travel plans. The goal of a wayfinding system is to enable travelers to maneuver through the transportation system more efficiently (VTPI, 2011a), and the best performance measure of a wayfinding system is its ability to navigate an individual through an unfamiliar area (Muhlhausen, n.d.).

An ideal wayfinding system is able to direct people their destination, regardless of their mode of travel. Todd Litman recognizes wayfinding as a strategy to encourage people to use non-motorized transportation (VTPI, 2011b). Wayfinding systems that allow users to identify a preferred mode of travel are referred to as multi-modal navigation systems, and are therefore a subsidiary and specific application of the more general wayfinding system. Much like general wayfinding systems, the more specific multi-modal navigation system includes the use of signs, guidebooks, websites and applicable electronic devices that may influence the mode choice. These tools should be tailored to suit the users' needs in order to be effective. Travelers should be able to easily evaluate their options for getting from an origin to the desired destination via

117

single or multiple transportation modes. Therefore, intuitive and easy navigation of transit services (e.g., knowledge of vehicle arrival times, finding routes/stops) is essential.

Multi-modal navigation systems may increase the use of alternative modes of transportation and reduce automobile travel. If this is the case, this demonstrates that along with TSM, TDM strategies are also supported by multimodal navigation systems. Researchers have found that use of high quality navigation tools results in a 17 percent mode shift from automobile to an alternative method of transportation (walking, bicycling, and transit) for daily employee commute (VTPI, 2011a). Multi-modal navigation tools can be implemented by transit agencies, transportation agencies or transportation management associations (VTPI, 2011a).

Organizations who work with tourists may also benefit from the implementation of wayfinding systems. In some cases, a visitor formulates perceptions about a downtown area depending upon the ease-of-use of a downtown area, as this is an important consideration for visitors. As a result, it is important for the area to make a good "first impression" by having a clear and attractive wayfinding system (Kittelson & Associates, Inc., 2008).

Four factors that determine the eventual success or failure of a wayfinding system are 1) environmental communication, 2) architecturally conscious spatial organization, 3) destination zones, and 4) information sequencing. Furnishing architectural clues is important. These include providing clear arrival points, convenient parking and accessible walkways and conveniently located information desks (Muhlhausen, n.d.). The use of "shorelines" and "trails" to delineate paths connecting major destinations and information areas is a good way to increase the ease of use of a wayfinding system (Muhlhausen, n.d.).

A multi-modal access guide should be implemented as part of the comprehensive navigation and wayfinding system. This access guide includes a map of the area, which should depict the user's current location, easily identifiable landmarks, major destinations and multi-modal stations and hubs. To comply with ADA requirements and to provide universal access beyond those federal requirements, persons with disabilities should be considered when the system is being designed (VTPI, 2011a).

Audible and tactile communication of wayfinding information is also useful. According to the US Department of Education, 50 percent of the American population has difficulty reading signs and understanding language-based communication. As a

result, using interactive, audio-tactile maps provides an additional means of communication.

Litman also recommends providing information about automobile parking availability and pricing schemes as part of the wayfinding system. Technological innovations allow for conveying real-time parking occupancy information, which can be delivered through electronic signage and in-vehicle communication devices (Kittelson & Associates, Inc., 2008). These innovations have implications for TDM and TSM, because users that are well informed about their transportation options are able to make better decisions about transportation mode, route, and time. Navigation tools may also prove to be an advantageous addition if implemented along with a package of wayfinding tools (VTPI, 2011a). This allows wayfinding programs to be more effective.

Clear signage is important for successful parking management. When a wayfinding system is implemented correctly, it may be a more effective tool for reducing traffic congestion than parking pricing adjustments. Additionally, proper signage is important to create the perception of comfort and dependability for customers that are not accustomed to variable parking fees (Kittelson & Associates, Inc., 2008). A consistent style or brand that ties together the different elements of the entire wayfinding program are essential to marketing the program. This includes using standardized signs, colors, maps, banners, websites and logos. It is important for graphics to be in plain language so that they are easily understood, and to be in the correct scale for the targeted audience. Font and sign sizes are intuitively different depending upon whether the target audience is vehicle scale or pedestrian scale. When it comes to pedestrian scale, signs must comply with ADA accessibility guidelines (Muhlhausen, n.d.).

Ordinances that require uniform signage for private parking facility operators can also be used to improve a driver's ability to locate and choose a parking facility. Signage regulation is often a hotly debated and contested issue between local governments that want to maintain control and private citizens that wish to express their First Amendment rights. Zoning and the use of police powers to control (to a certain extent) what an owner can do with their private property was enumerated in the Supreme Court case *Village of Euclid v. Ambler Realty Co.*272 U.S. 356. In 1954, the Supreme Court broadened the police power to include issues of aesthetics with the ruling in *Berman v. Parker,* 348 U.S. 26. Local governments have been using these Supreme Court holdings to substantiate the regulation of signage. On the other hand, the First Amendment provides protections for the freedom of speech. In 1975, the Supreme Court heard the case *Bigelow v. Virginia*, 421 U.S. 809 and found that First Amendment protections were extended to commercial advertisements, signs included.

Therefore, there is a fine balance that must be struck regarding the regulation of signage (Jourdan, Hawkins, Abrams, & Winson-Geideman, n.d.).

When it comes to regulations and ordinances pertaining to parking signs in particular, similar concerns arise. With numerous parking vendors in a downtown area, situations can arise in which parking signage becomes gratuitously overwhelming. For example, in Fort Lauderdale, there are 13 parking providers that operate in the study area, each with proprietary signage. In many cases, each provider operates multiple facilities in different areas of the city, and each facility is likely to have multiple signs. This strategy seeks to implement universal guidelines that private vendors must follow regarding their signage.

Most regulations attempt to control the size, shape, etc. of the sign. Local governments may wish to regulate some key signage criteria, which can be categorized into three groups: sign characteristics, locational characteristics, and environmental characteristics. Sign characteristics include such features as the type/style of sign, and the overall size, shape and color of the sign's content. Locational characteristics include the sign's offset from the viewing angle, and the sign's orientation relative to the viewing location. Environmental characteristics include the features of the viewing background, the time of day, and the travel speed of the reader/user (Jourdan et al., n.d.)

FDOT provides regulations for the implementation of parking and wayfinding signage in "Florida's Highway Guide Sign Program: Operations Rule Chapter 14-51. F.A.C.". This document was created in part from, and adheres to, the Federal Highway Administration's (FHWA) Manual on Uniform Traffic Control Devices (MUTCD). Regulations require that wayfinding signs installed in the ROW of the State Highway System must adhere to regulations set forth in Florida's 14-51.051 code. Local municipalities that wish to implement non-complying wayfinding signage programs in the ROW of the State Highway System should submit a Request to Experiment to the FHWA. According to the regulations, wayfinding signage is prohibited on limited access facilities and ramps (FDOT, n.d.; FHWA, 2009).

The regulations also prescribe a number of design criteria to which wayfinding and parking signage must adhere. Namely, specific colors (i.e., red, yellow, orange, fluorescent yellow-green, and pink) cannot be used in order to avoid confusion with common regulatory and warning signs. Signage fonts must be highway gothic fonts or FHWA approved. In addition, FDOT limits the amount of destinations displayed on each sign to three (FDOT, n.d.). These same design conventions can be used to implement uniform signage regulations for parking providers. FHWA also recommends

that green 'Permissive Parking' signs be used in the event that time-limited parking is allowed at certain locations. These can be used in combination with red 'Parking Prohibition' signs in the event that parking is allowed in certain locations but not in others. FHWA allows municipalities to incorporate TOW-AWAY ZONE signs with prohibition parking signs for improved communication; the thought being that a definitive warning will make prohibition signs more effective (FHWA, 2009).

Similarities can be drawn from regulations that govern signage of automobile fueling stations. Regulations governing the display of gasoline and diesel prices at fueling stations have been emphasized.. The uniformity of display characters is often regulated so that purposeful and inadvertent deception of price and/or product can be avoided. One specific example of these regulations comes from Minnesota, where the Minnesota Department of Commerce has required the clear advertisement of fuel price per gallon, including all taxes and fees. If conditions or restrictions apply (i.e., cash only), those must also be clearly stated on the street-side sign (Minnesota Dept. of Commerce, 2008). Parking providers could be regulated in the same way, and requirements could be made so that misleading pricing schemes could be avoided.

Examples

Los Angeles

Los Angeles' *Express*Park is a one-year pilot program aimed at updating the parking system in Downtown Los Angeles. The program will includes a parking guidance system, and much like SF*park*, will use multiple ITS platforms including in-vehicle navigation and Smart Phone (i.e., iPhone and Blackberry) accessible information. Drivers will also be able to call and find spaces using *Express*Park's built in voice-recognition software. These systems will be complimented by electronic signage at street-side locations and in garages (see Figure 10) that display information about parking availability (LADOT, n.d.).

San Francisco Bay Area

SF*park* is a program that is attempting to improve the parking experience in San Francisco. One way that the program accomplishes this is by using multiple ITS devices to facilitate use of the system. Information is conveyed through multiple applications, such as an iPhone app (an Android app is coming soon), a 511 phone system, text message notifications, and electronic displays signs in high traffic locations (SFMTA, n.d.). The program receives supply information through the use of wireless, in-ground sensors that collect real-time occupancy data. Entrance and exit gates in

parking garages also keep a running tally of the total number of vehicles in the structure (SFMTA, n.d.).

FIGURE 10 - EXAMPLE OF *EXPRESS*PARK SIGNAGE

Source: Kudler, 2010

The program achieves a cohesive look by using comprehensive branding logos and universal signage throughout the implementation area. The goal of SF*park* is to unify the program and simplify the user's experience. Prior to program implementation, complex signage displayed 22 different rate types across the city. Now, parking prices are communicated to the user using two different signage types: large boards at garage entrances and smaller signs on pay stations and cashier booths. The pricing formula is implemented in a way that allows time for pricing signs to be updated as needed (SFMTA, 2011).

Prior to the creation and implementation of the SF*park* system, a pilot project was executed in the Rockridge neighborhood of Oakland. The project, which was active from 2004 to 2006, attempted to manage traveler demand at the Rockridge BART station. The project employed multiple ITS systems, including fixed location variable message signs (VMS), parking lot counting systems, and information updates by mobile phone (as seen in Figure 11). The VMS displayed real-time parking vacancy figures, as well as the general location of the parking facility. Signs were also used on portions of California's State Route 24 and on local roadways (Shaheen & Kemmerer, 2008).

Fixed station and wayfinding signs were effective at both directing vehicles to the BART station, where there was smart parking, and at alleviating congestion associated with cruising for parking. The fixed signs displayed the hours of operation and the

location of the smart parking spots (Shaheen & Kemmerer, 2008).

FIGURE 11 - EXAMPLE OF MOBILE WAYFINDING SIGNAGE
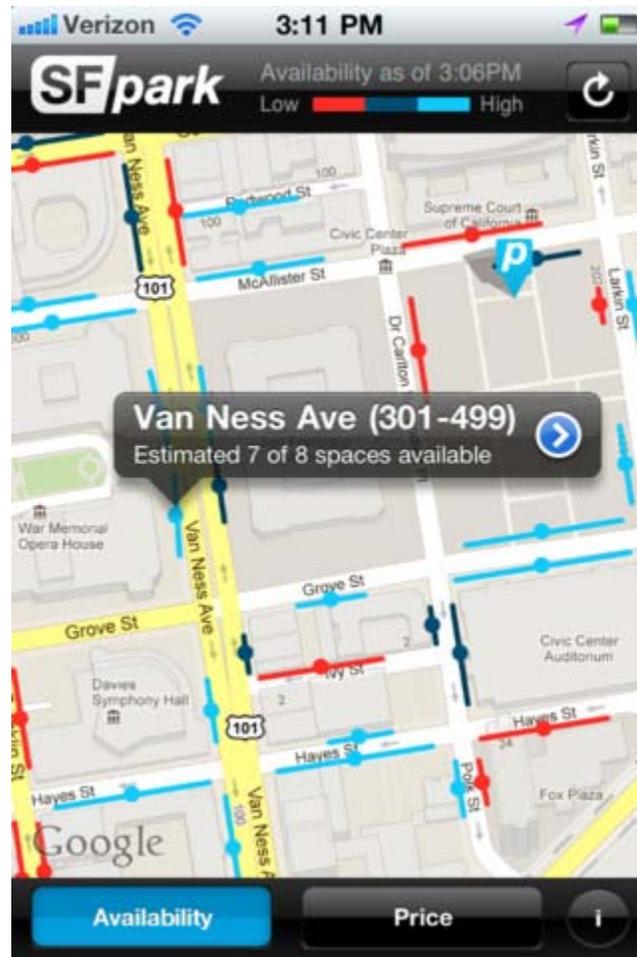
Source: Apple Inc., 2011

Post-implementation surveys yielded important results regarding the perception of the program by the public. According to respondents, the signs were underused. Fifty-eight percent of survey respondents did not use the signs in their decision-making process. Of those individuals that did use the signs, thirty-five percent found the information to be accurate, 54 percent were unsure of the accuracy of the information, and 11 percent did not think the information was accurate. Travelers expressed concerns that VMS were not located in opportune locations along daily commute routes, and that the information displayed on the signs was not descriptive enough. Some individuals were reluctant to use the smart parking facility because they were uncertain if spaces would still be available after the delayed time of navigating to the parking location from the highway (Shaheen & Kemmerer, 2008).

Implementation of the signage was modified based upon the user survey responses. Through these responses, it was determined that providing a public education program would have helped users to better understand sign messages and purpose, and that better project branding (i.e., project name and logo) was needed in order to market the project and make the wayfinding program more effective. Finally, it was also determined that additional signs would have helped more drivers locate spaces, and that providing some fixed signs in Spanish would have increased user accessibility (Shaheen & Kemmerer, 2008).

Temporary (e.g., mobile) (see Figure 12) wayfinding signs can also be used effectively during special events, to direct traffic and visitors unfamiliar to the city to designated parking areas during periods of high demand.

Current Application in Project CBDs

Fort Lauderdale officials acknowledge that current signage is excessive and that it makes navigating the city difficult. Despite this, Fort Lauderdale currently has no plan to revamp directional signage or implement a holistic wayfinding signage system for the downtown area. There are, however, plans to implement a signage system along the beaches of Fort Lauderdale. If that program is successful, City officials hope to implement a similar program for the downtown area in the future (D. Alarcon, Personal Communication, June 3, 2010). Therefore, for the sake of completeness, the Fort Lauderdale Beach wayfinding program will now be reviewed, since the system may be replicated in the downtown area in the future.

FIGURE 12 - EXAMPLE OF MOBILE WAYFINDING SIGNAGE

Source: Gail [screen name], n.d.

124

The DTM is working with FDOT and the City's Planning and Zoning Department to create a holistic, global signage and wayfinding program. The City seeks to create a uniform set of signage for vehicular, pedestrian, and parking destinations, which will change color based upon their presence in a particular district. (The districts were determined by an earlier planning and zoning study.) It is important to note that the signage ordinance for Fort Lauderdale does not require a uniform set of parking signs for private operators (D. Alarcon, personal communication, June 3, 2010). The program will start on the barrier island, and may eventually extend to the downtown. The barrier island portion of the program was expected to be completed by April 2011.

The goals of the project are to create uniform signage, to consolidate signs in order to reduce 'sign pollution', and to install signs that are tough enough to withstand the harsh elements of the beach (i.e., wind, sun, sand). The system will include the following six different sign types: vehicular wayfinding; pedestrian directional; transportation (bus routes and stops); parking directional; parking identity (destination marker); and beach regulatory (describes beach rules). The plan is to implement the system in the following three phases:

Phase One – Issue RFP for prototype sign fabrication (completed by January 2011). Signs fabricated and installed (completed by March 2011).

Phase Two – Issue RFP for fabrication of Phase Two and Phase Three signs. Fabrication and installation of the majority of the rest of the signs (completed July – October 2011). This phase includes: 37 vehicular wayfinding, 43 parking directional, 7 parking identity, 37 pedestrian directional, 16 beach regulatory, 48 bus/trolley stop

Phase Three – Fabricate and install final sign items by early 2012. This phase includes: 3 vehicular gateway signs, 3 pedestrian gateway signs, 13 beach regulatory signs

The project is expected to cost an estimated $760,631 for sign fabrication. With about 204 signs, the per sign cost is $3,728 compared to $2,094 in 2005 for Miami Beach's signage program and $5,000 in 2009 for Asheville, North Carolina's sign fabrication (City of Fort Lauderdale, 2010).

The original plan was to fund the program using money from the Federal Highway Scenic Byways Program (D. Alarcon, personal communication, June 3, 2010). Unfortunately, Fort Lauderdale was not selected as one of the three cities to receive

program funding. However, the program has been funded and officials are moving forward with Phase One of the project (D. Alarcon, Personal Communication, October 13, 2011)

Officials at the DTM have realized that they need to make some changes to the current proposal, one of which is to establish a standard emblem. They also plan to add informational signs to inform people of the location of key destinations, along with directions and distance to destinations. The Department is tweaking the proposal and hopes that forward progress will be maintained, since there continues to be strong community support for the project. However, FDOT must approve the new changes that the City is proposing, and there is also lingering concern regarding where money will come from in order to fund the recurring maintenance cost of the signs (D. Alarcon, Personal Communication, July 14, 2011; D. Alarcon, Personal Communication, October 13, 2011).

Fort Lauderdale generally lacks regulations that describe proper use of signage as they pertain to parking facilities, but a few do exist. The City's code of ordinances requires that non-illuminated parking signs be used for parking in residential zoning districts. Additionally, no more than four light poles per one acre area of a surface lot may be used for banner signs. Banner signs are defined as streamers and wind-driven signs that are often applied to cloth (City of Fort Lauderdale, 2011). The municipalities in Broward County have an interlocal agreement that grants control of signage to the County, and the County implements signage according to standards set forth in the MUTCD (D. Alarcon, personal communication, April 20, 2010).

Miami does not currently have a uniform wayfinding and directional signage program. A number of government employees who are familiar with the situation have identified the lack of such a program in downtown as a problem. For instance, there is a need for signage that identifies where people can park. Currently, people are unaware of their parking location options. Implementation of a signage and wayfinding program should help drivers find these locations (A. Noriega, Personal Communication, May 12, 2011).

The Miami DDA has plans to implement a wayfinding and signage system program for Downtown Miami, but is waiting to have the system permitted before they can begin work to implement it (S. Ingle, Personal communication, May 11, 2011). Signage details and specifications, including sign design and proposed locations, have been determined and are ready to be submitted for a Request for Proposal (RFP) process (S. Ingle, Personal communication, May 11, 2011). However, although the system has been designed, it has not yet been received the funding and is subject to

change (J. Goldstein, June 6, 2011)

Gannett Flemming, an international engineering consulting firm, designed the wayfinding system for Miami. As of December 2010, the program included more than 280 message signs, fifty-eight of which will specifically direct drivers to parking. The program also boasts universal signage for the downtown area. The area that will be served by the wayfinding program includes the CBD (the area under consideration in this project), the Arts and Entertainment District (north of the study area), and the Brickell District (south of the study area) (Gannett Fleming, Inc., 2010).

Signs include the following types: district identifying gateway signs; vehicular and pedestrian scale directional signs to attractions; directional signs to parking; and destination signs for attractions. All signs will be installed in public ROW and will not require private involvement in the permitting process. Signs will be installed on both new and existing infrastructure. Signs will identify 11 different destination types, including the following: Districts; Sub Districts; Higher Education; Transportation; Government; Destination Streets; Museums; Large Attractions; Adjacent; Parks; and Other. Table 17 shows the specific destinations that are categorized under each destination type (Gannett Fleming, Inc., 2010).

The project will be funded using a one million dollar grant from the FDOT. Two-thirds of the project cost will be funded using a FDOT Transportation Enhancement Grant. The project was recommended for funding in fiscal year 2015/2016. However, there has been a logistical conundrum that initially excluded the program from the work plan. The problem is being resolved and the project has been elevated to a "best pay go" status so the City need not to reapply to get on the State's funding list. The best case scenario is for permitting and the bid process to take place in 2011 and the signs begin fabrication in fall 2011 (S. Ingle, Personal Communication, May 11, 2011).

The City of Miami Code of Ordinances describes signage regulations for private parking lots. Section 35-283 requires the use of two signs to display parking rates, with one sign located at each entrance, or both signs located at one entrance if only one exists. The sign placement must be between five and eight feet above the ground, and the signs must be at least two squared feet in size with sign font at least six inches tall. Sign content must include the price for parking and the period of time that the price is charged. When it comes to publically controlled facilities, the Section 35-123 of the City Code authorizes the MPA director to designate traffic control signs (City of Miami, 2011).

TABLE 16 - DESTINATION SIGNS

Destination Sign Type	Listed Destinations
Districts	Art & Entertainment District, Brickell District, Central Business District
Sub Districts	Jewelry District, Wynwood
Higher Education	Miami International University, Miami-Dade College
Transportation	Port of Miami
Government	County Courthouse, Federal Courthouse, County Government Center, City Administration Building, Courthouses
Destination Streets	Biscayne Boulevard, Brickell Avenue, Flagler Street Shopping
Museums	Children's Museum, Museum Park
Large Attractions	AA Arena, Amphitheater, Arsht Center, Jungle Island, Convention/Knight Center, Freedom Tower, Cultural Center, Main Library, HistoryMiami, ArtMiami, Gusman Center, Welcome Center, Miami Circle
Adjacent	Overtown, Midtown Miami, Miami Science Museum, Little Havana, Key Biscayne, Design District, Coconut Grove, Seaquarium, Virginia Key Beach, Baseball Stadium
Parks	Bayfront Park, Bicentennial Park, Mary Brickell Park, Margaret Pace Park, Simpson Park
Other	Bayside, Brickell Village, Bayfront, Downtown

Source: Adapted from Gannett Fleming, Inc., 2010

Evaluation – Wayfinding Systems

Wayfinding programs do not increase the cost of vehicle-based trips or the need to make automobiles trips. However, depending upon wayfinding program characteristics, they may create incentives for travelers to use alternative modes of transportation. If travelers are made aware of all of their travel options and travel times through the wayfinding system, they may be more inclined to take alternative modes of transportation depending upon personal needs. However, wayfinding systems do not directly subsidize or decrease the cost of alternative modes of transportation for the final user. This strategy does not decrease the use of parking, but rather makes the system more efficient. Wayfinding programs also may reduce cruising for parking if drivers are well aware of their parking options.

Wayfinding programs do not promote or support the development, expansion, or upgrading of the infrastructure needed to support alternative modes of transportation. Similarly, the programs do not provide financial assistance for the recurring operational costs of alternative modes of transportation, and they do not affect any factors that can improve the provision of services. However, wayfinding programs may encourage cooperation between different modes of transportation if the programs are holistic and offer information regarding multiple modes of transportation.

The main social benefit of wayfinding systems is to provide information to the user so that they may make efficient use of the transportation system. The transportation system can operate more efficiently by moving more traffic by all modes, including both personal travel and freight movement, and reducing the level of cruising for parking. If improperly implemented, however, the wayfinding system may cause more confusion and reduce the efficiency of the transportation system. Generally, the social benefits of implementing a wayfinding system outweigh the social cost because there are minimal social costs.

Wayfinding programs do not provide a means to raise money for municipalities. Since money is not raised using this program, revenues are neither allocated to any particular agency nor earmarked for particular capital improvements or recurring operational costs. Wayfinding programs do not specifically raise money, but they do require capital investment funds as well as recurring maintenance costs; the programs typically require a larger capital investment with minimal cost for upkeep. Municipalities generally try to raise capital funding for wayfinding systems through State or Federal grants, and raise funding for recurring maintenance through local funds.

Wayfinding is not a politically sensitive strategy. Stakeholders, generally, see positive benefits from the implementation of a wayfinding program. Wayfinding programs allow regular users to more efficiently use the transportation system, and provide visitors with directions to major attractions in the area. Therefore, it is unlikely that there would be negative stakeholder perception of this strategy. Local stakeholders may have a say in the design and some implementation characteristics of the program, however, it is unlikely that stakeholders would have the means or reason to block implementation; there is a greater chance that stakeholders would want to expedite implementation.

The public usually supports these programs with few legal and political constraints to prevent them from being implemented. Indeed, wayfinding programs do not require enactments of new laws and the approach is legally robust, as multiple wayfinding systems have been implemented around the country without any concerns

of lawful feasibility.

Wayfinding systems are being implemented in Downtown Miami and at the beach and eventually in Downtown Fort Lauderdale. However, both downtowns could benefit from tweaks and additions to their respective implementation plans.

Evaluation – Signage Regulations

Uniform parking signage ordinances are unlikely to impact the demand for automobile trips. However, depending upon the type of signage that parking provider's implement, it could affect demand. Better signage may attract more parkers, which may induce more trips. Uniform parking signage neither increases the cost of vehicle-based trips nor decreases the need to make trips. Signage does not create incentives for travelers to use alternative modes of transportation or subsidize the prices of alternative modes of transportation, and it does not decrease the use of parking.

The main benefit of the implementation of sign ordinances for parking is that they subdue the provision of intentionally and/or inadvertently misleading information. As mentioned in Technical Memorandum 6 (Steiner, Jourdan, Blanco, Mackey, Perch, Hanley, Sucar & Rachmat, 2011b), many parking providers do not display parking rates in a clear manner. Some private parking providers mentioned that current laws that govern signage are to blame for this issue. Fixing this problem will give travelers confidence that they are not being misled by private parking providers. Uniform signage can also improve traffic circulation as user information is improved. Uniform parking signage comes with negligible social cost, resulting in a situation where benefits outweigh costs.

Implementation of parking signage regulations can generate revenue for municipalities in the form of permitting fees. Local governments typically make money on permitting fees, and parking signage would be no different. Depending upon how the municipality would like to use collected revenues, monies could be allocated to specific agencies or earmarked for specific uses. This strategy is financially self-sustainable since the only costs of implementation are processing and code enforcement patrols, and it is financially stable because the revenues and costs are not subject to uncertain changes.

Signage ordinances are oftentimes met with political and public opposition. This is because public and private vendors are competing for the same audience, which makes this strategy potentially contentious among the private providers. They may feel that these regulations will prevent them from making money because they have to

130

compete with public parking facility signs that may be subject to different signage requirements. The strategy is clear and does not require new institutional framework. It is compatible with current practices, and is flexible enough to fit the specific needs of the community. Although it does require the enactment of new laws, it is legally robust and is allowable under state regulations.

As a result of this strategy being clear and intelligible, it can easily be 'sold' to the general public. Additionally, because it is very flexible, it can easily be tailored to fit different contexts. Implementing this strategy may require coordination with the State and Federal Departments of Transportation in order to gain permission to place signage within the State and Federal Highway System ROW, and local government coordination would be required for other remaining roadway facilities; the city, state, and USDOT have different regulations about what signage can be placed in their ROW. While existing state legislation does permit the approach, signage must abide by guidelines set forth by FDOT.

Regulation of parking signage is currently being implemented in Miami and Fort Lauderdale. However, more could be done to regulate signage in both municipalities. This is especially true since multiple government officials have mentioned that signage is a problem in their respective community. Therefore, increased uniformity and standardization could be used to better regulate parking providers in both cities.

Recommendations

The Miami DDA has plans to implement a directional wayfinding system in the near future and has contracted with the design team of Gannett Fleming and MERJE to develop a comprehensive signage and wayfinding system for downtown Miami. One addition to these plans, which would make the system more effective, is the use of technological applications that inform drivers of the number of available parking spaces in particular locations; similar systems have worked well in San Francisco with the SF*park* program. It is also recommended that the statewide 511 traveler information service be integrated into the wayfinding system. Florida Statute 334.044 provides for traveler information to be disseminated via this method, which would add another layer of accessibility for travelers seeking information on parking.

Despite the application of parking signage regulation in Miami, officials have expressed interest in standardized signage ordinances, and have mentioned the desire to establish a standardized method of displaying parking rates. This is likely due to reports of private vendors in Miami using deceptive practices to post parking rates. Miami officials have also mentioned that they would like users to be able to distinguish

between public and private parking vendors through signage cues (A. Noriega, personal communication, May 3, 2010; S. Ingle, Personal communication, May 11, 2011). As a result, it is recommended that the City of Miami planners and the DDA amend their current signage ordinances to further regulate parking signage; uniform signage regulations could be designed based on guidelines set for in Chapter 2B of the MUTCD (FHWA, 2009). These organizations should coordinate their efforts with FDOT.

Since wayfinding system implementation is not currently planned in Downtown Fort Lauderdale, it is recommended that such a system be developed (see Tables 5 and 6). The DTM is the recommended implementing agency for this strategy, and it is also recommended that officials coordinate with FDOT. The downtown area could benefit from a comprehensive signage system; if implemented correctly, travelers would be better informed about downtown destinations and their options for getting between the two parts of the downtown. A uniform signage system would also help to identify the Downtown as a unified area.

In Fort Lauderdale, officials have admitted that there is 'sign pollution' in the downtown area, which can be overwhelming (D. Alarcon, personal communication, June 3, 2010). As a result, Fort Lauderdale planners should also adopt signage ordinances to better manage both public and private parking vendor signage. Public and private parking should be regulated in the same way in order to equalize competition and to make it easier for those seeking spaces to find them. Uniform guidelines can be written using standards set forth in the 'Regulatory Signs, Barricades, and Gates' Chapter of the MUTCD.

ELECTRONIC SYSTEMS

Description

Changing technologies have expanded the options and opportunities for collecting parking fees, many of which are still being explored and adapted. Collection methods that are increasing in popularity and use among those involved with parking are multi-space meters, pay-by-phone, and in-car systems. Alternatives, such as payment by SunPass, or collection by other electronic tolling systems, have varying levels of feasibility and are also being discussed.

Multi-space meters are similar to the traditional single-space meter in that they are both part of the physical parking infrastructure. These meters typically employ two methods of collection: pay-and-display, where the user receives a receipt that is then

displayed in the vehicle, or pay-by-space, where information is stored in the meter. Often, these methods allow users to pay by credit card, which increases the number of payment options. In addition to meters and electronic tolling, pay-by-phone is a collection method that allows users to purchase parking time using their cell phone. This method generally requires that the user set up an account before beginning, and often charges a per-usage fee. Finally, in-car payment systems, which typically rely upon a small wireless device with a display monitor that can be easily read by enforcement personnel, are also an option. After purchasing this device, the user must pre-load it with money in order to use the device for parking (Shoup, 2005). However, this device is more accurate and allows the user to pay for only the time they spend parked in the spot.

Several collection methods can be used in the same area. For example, multi-space meters can be used in the same area as pay-by-phone or in-car systems. Some of the methods require higher initial start-up costs, such as multi-space meters, and pay-by-phone systems, while others require more maintenance. In addition, if multiple methods are used simultaneously, parking enforcement must accommodate each of these systems. Equity and access are additional concerns if certain systems, such as pay-by-phone or electronic tolling, which require users to access the requisite technology, are the only options available in a single area.

Examples

Many communities currently use meter technology. Single-space meters are quite commonplace, as they are the traditional collection method, and multi-space meters (see Figure 13) are becoming increasingly popular throughout the United States. Shoup (2005) uses Aspen, Colorado, as an example of a place with pay-and-display meters, and Berkeley, California, as one with pay-by-space meters.

At present, Florida uses the SunPass Plus program, which is a part of SunPass, and allows users to pay for parking at certain airports (e.g. Palm Beach, Tampa, Miami, Orlando, Fort Lauderdale-Hollywood) using the SunPass. Interviewees suggested that perhaps this could be expanded to include paying for parking in downtowns, such as Fort Lauderdale and Miami. Coordination of such an expansion, however, would be difficult and potentially expensive, as SunPass is operated through the Turnpike Authority (O. Meitin, personal communication, July 5, 2011).

FIGURE 13 - EXAMPLE OF SF*PARK* MULTI-SPACE METER

Source: SFMTA, 2010b

Several other states use Electronic toll collection; the largest such system is EZ-Pass, which is used by 24 members in 14 states (E-ZPass Interagency Group, 2011), including Illinois, Indiana, Ohio, West Virginia, Virginia, Pennsylvania, Maryland, Delaware, New Jersey, New York, Rhode Island, Massachusetts, New Hampshire, and Maine. E-ZPass Plus, like SunPass Plus, can also be used in certain airports (e.g. Newark, LaGuardia, JFK, Albany, Atlantic City, Syracuse). For example, a surface lot and parking garage in Atlantic City, NJ allows users to pay with E-ZPass Plus, demonstrating that this is a feasible option.

Pay-by-phone use is increasing rapidly in the United States. According to PayByPhone, a company that was formerly known as Verrus, over 30 cities in the United States and 180 in North America and Europe are using this technology. These cities, from Anchorage to Chicago, show the diversity of use associated with this method.

Current Application in Project CBDs

Fort Lauderdale uses several methods for collecting parking fees. The city employs multi-space meters as well as pay-by-phone services, and parkers also have the option of using the Fort Lauderdale City Card from Parcxmart Technologies at certain meters, with additional meters likely accepting the card in the future. This card allows users to pre-pay for parking. The SunPass Plus payment option is only available at the airport (City of Fort Lauderdale Parking Services Division, 2011), much like it is in Miami.

The City of Miami is employing several innovative collection methods. First, the MPA is currently replacing traditional single-space meters with pay-and-display ones that accept credit cards and operate on solar power. Second, the pay-by-phone option is currently available. Miami also allows people to pay for monthly parking by direct withdrawal, pay by mail, or in person. As mentioned above, SunPass Plus is an option at the Miami airport, but is not available at other locations in the city (MPA, 2011b).

Evaluation

Innovative collection methods do not necessarily increase the costs of vehicle-based trips, unless combined with other technologies. Similarly, they do not decrease the need to make trips, and they do not reduce the incentive to use alternative modes of technology when used by only for the automobile trip. Rather, the collection methods can increase efficiencies of both parking and parking enforcement, as opposed to decreasing the use of parking.

Parking collection technology does not promote the development, expansion, or upgrading of the infrastructure needed to supply alternative modes of transportation, unless this infrastructure is integrated with the parking collection technology. It does not necessarily promote financial support for the regular operation of the alternative modes of transportation, unless combined with other technological advances or a change in financial structure. Similarly, this strategy alone will not encourage better coordination among alternative modes of transportation. The strategy does not subsidize or decrease the cost of providing alternative modes of transportation or those factors that can improve the provision of alternative transportation modes.

The main social benefit of this strategy is ease of use. These methods allow users to have multiple options when paying for parking, which can make paying for parking faster and more efficient. This could also potentially decrease the need for single-meter parking, which could improve the physical streetscape and cut down on maintenance costs. The main social costs of these innovative collection strategies are that they could potentially be expensive to implement and maintain. In addition, they present questions of social equity when implemented singularly. Generally, the social benefits outweigh the costs, though this depends on the individual collection method and community character.

Electronic collection methods provide a means to raise revenue. They can be used in conjunction with other methods to generate additional funds through the cost-savings of implementing new technologies with lower maintenance costs, and through the pricing schemes they allow. Ultimately, the revenue collection system is set up

every community based upon the needs of the users (e.g., downtown employees, shoppers and tourists are likely to use parking differently), and the administrative structure of parking management. The approach may be financially self-sustainable for the agency in charge, depending upon the set-up costs for the chosen collection method.

Collection methods may encroach on politically sensitive topics, depending upon the chosen method and the particular community. Collection by electronic tolling, for example, can be politically charged. Certain stakeholders may see their interests affected by this method, as some stores may benefit through sell the electronic tolling devices or the in-car wireless collection device. The relationship between local employees and parking could also be strained, depending upon the system, as employees might be required to move parking spaces more often than under current systems. Potential for the acceptance of these new collection methods is largely dependent upon the individual stakeholders involved and how they currently use metered parking.

Overall, electronic collection systems are clear and intelligible. The approach does not require a new institutional framework, unless it involves systems, like electronic tolling that are incompatible with the electronic parking collection. The institutional framework should be governed and follow the same rules as current parking collection methods. Electronic collections do not require the enactment of new laws or modifications to existing ones, and should be legally robust, unless there are questions regarding the use of GPS or electronic tolling collection technologies. The approach can be modified according to the collection technologies preferred.

Both CBDs are currently implementing parts of electronic collections systems. They are being implemented to current standards and do not have perceived flaws or require major changes. Other parts of this strategy are not being implemented and could easily be integrated with current technologies. While this strategy does not directly reduce parking, it could make paying for parking an easier process.

Recommendations

Both Miami and Fort Lauderdale are using many of the current and innovative parking collection technologies described in this section (see Tables 5 and 6). The use of SunPass was mentioned in several interviews, but its expansion faces many potential obstacles, including the involvement of a complicated web of partners. However, as EZPass Plus illustrates, this is indeed possible and an option that should not be disregarded, even though there are still many unknown variables involved.

The implementation of certain parking fee collection strategies could present a problem, as it may require another level of governmental coordination. However, because Miami and Fort Lauderdale have already implemented many of the collection strategies, and have done so effectively and in an innovative fashion, the potential hurdles involved in coordinating the methods has already been addressed. As other technologies, such as in-car, are introduced, this will require that the existing structure be expanded to include the new methods; however, this should not present a significant problem. Overall, Miami and Fort Lauderdale are well situated with respect to collection technology.

SENSORS, REAL-TIME DATA, AND PARKING PRICING APPLICATIONS

Description

The use of real-time data is currently being integrated into parking technology and use. Sensors, linked to internet and cell phone applications, are the most visible and advanced use of real-time data. These sensors can be used to coordinate open spaces, adjust pricing, and provide current information to the public so that parking efficiencies are maximized. However, real-time data from the internet and cellphone applications that do not utilize sensors could also help users locate parking.

Real-time data and sensors provide users with an understanding of current parking availability and allow them to make informed decisions about where to park. They can also influence how much users pay for parking making the data and sensors a potentially effective way of maximizing parking costs and revenue. The use of real time data could easily influence the choice to use transit instead of driving, cruising for parking, cost efficiency, and revenue generation. However, the use of this technology while driving is potentially unsafe behavior. Additionally, the implementation costs can be high, particularly because the sensor technology that provides parking information to the public is still quite new and in the early stages of development.

Examples

Currently, San Francisco is participating in a federally-partnered Urban Partnership Agreement & Congestion Reduction Demonstration Program, which focuses on sensor technology as it relates to parking. As a result of its participation in this program, San Francisco developed SF*park,* which was opened for public use as a pilot program in April 2011. According to the SF*park* website, this service "optimizes the

use of existing parking resources to benefit drivers and everyone else who spends time in San Francisco" by making parking easier to find and pay for, decreasing cruising for parking, and overall making the streets safer for bicyclists and pedestrians, while increasing the quality of life for those nearby (SF*park* 2011). SF*park* allows users to access real-time data on parking availability through the Internet, smartphone applications, and eventually text messaging and 511 services. Prices are adjusted to maintain the idea level of parking availability, and sensors track the availability of parking spaces. In 2012, the program will be evaluated and then implemented throughout the city.

In Los Angeles, *Express*Park, a complementary project to Express HOT lanes, is being implemented using sensors and ITS technology. Information about parking availability and pricing is relayed to potential users via cell phone technology, VMS boards, and the Internet. Like SF*park*, this project is fairly new, and it is anticipated that it will be fully operational in 2012. Until then, it is difficult to evaluate the system's progress, as well as its potential application to either downtown Miami or Fort Lauderdale.

Current Application in Project CBDs

Fort Lauderdale has a list of parking locations available on their website, but the list is not interactive and it does not provide real-time information. Diana Alarcon, Director of Fort Lauderdale's DTM, mentioned that there was talk of developing an application for Fort Lauderdale's public parking, but that the application developers required that the lots be personally manned, which is not currently the case.

Currently, the MPA allows users to search for parking through their website, which can be accessed by mobile devices, and offers maps which provide information on parking locations. However, it does not provide real-time information.

Evaluation

The application of real-time data into parking management does not increase the cost of vehicle-based trips for all users, however, some users may pay more to park under certain circumstances. It does not decrease the need to make trips, although it could create incentives for the use of alternative modes of transportation if the price of parking increases or parking is not readily available. The use of real time data does not affect the price of alternative modes of transportation nor does it create incentives to decrease the use of parking.

This strategy does not promote the development, expansion, or upgrading of infrastructure needed to supply alternative modes of transportation, and it does not promote financial support for the regular operation of alternative modes of transportation. Real-time data programs do not necessarily encourage better coordination among alternative modes of transportation, and they do not subsidize or decrease the cost to the providers of alternative modes of transportation, unless excess revenues from the pricing structure changes go towards funding alternative modes of transportation.

The main social benefits of this strategy are that it promotes efficient pricing of parking and provides real-time information to users, so that they can find parking quickly and easily, which could reduce congestion. The cost of this strategy includes the potential that users will use handheld devices while operating their vehicles, which can be dangerous. Because not all users have equal access to the applications, there is potentially an equity concern. Therefore, while the benefits should outweigh the costs, this issue requires further study.

This approach provides a means to raise money, which could go to the same agency that collects the funds. These revenues could be earmarked for the purchase or maintenance of additional technologies, parking facilities or transit/transportation facilities, depending upon the parking revenue structure. If people do not park in areas where this technology is being used, the price of parking would drop and there is the potential that less revenue would be collected. However, because a large portion of the cost of implementing this strategy is incurred in the beginning, this scenario should not greatly affect the financial sustainability of the strategy in the future.

This approach is potentially politically sensitive, as the technology is quite new and expensive. However, over time this is likely to change, as people become familiar with the process. However, concerns about the potential misuse of this technology might keep it politically sensitive issue. It is currently unclear if stakeholders will see their interests affected by this strategy, as it is too early to know all of the effects of the strategy. The approach is fairly clear, intelligible, and easy to explain to the general public. It could require a new institutional framework, as someone needs to run the sensors and application programs, unless they are incorporated into the responsibilities of current parking agencies. The parking agencies should have governability over the implementation and results of this strategy, which should be compatible with current policies. Current practices might have to be adjusted if there are still traditional meters in the area, though new laws should not need to be enacted. This approach should be legally permitted; however, because it is quite new, there could be concerns that may need to be addressed. At the present time, this technology is still evolving and its

flexibility will depend upon its implementation and development.

The use of real-time data is not currently being implemented in the CBDs, and its use would require the installation of sensors and application development. Also, the parking covered by this technology would need to be defined and studied.

This strategy does not address many of the first 6 criteria, particularly those addressing transit and transportation alternatives. Additionally, this strategy is still fairly new and would require technological updates. It can be built in phases; for example, real-time data access could be a start. This strategy could also be implemented over a short-term period, so long as there is financial support for its implementation.

Recommendations

SF*park* is the most innovative real-time parking technology currently being used in the U.S.; however, it is new and its effects are not yet fully understood. While providing users with real-time data on parking availability would improve the efficiency of the transportation system, a better understanding of the life-cycle costs is needed (see Tables 5 and 6). When the studies on the implementation of SF*park* become available, downtown leaders in Fort Lauderdale and Miami should evaluate the applicability of these results for their respective cities.

G.   IMPROVING PUBLIC EDUCATION THROUGH SOCIAL MARKETING

Public education should accompany the endeavors of any municipal organization. Raising awareness and engaging the public's support promotes the success of implementing a new parking strategy. Public education is a great way to bring transportation and parking issues to the attention of stakeholders in the community, and to highlight areas in need of active change and participation. The following section describes a strategy recommended for improving public education efforts regarding coordination of parking with land use and transportation in South Florida.

Description

Technical Memorandum 6 (Steiner, 2011b) identified that one of the most consistently raised issues in both cities was the need for public education to curb demand for parking and promote alternate modes of travel. The South Florida culture is auto-dominated and intervention is necessary to create incentives for changes in travel behavior. Throughout the US, certain negative perceptions associated with alternative modes of travel, including both cycling and public transportation, impede their use and perpetuate favor of the private automobile, thus preserving the demand for parking.

In other parts of the world, such as in Holland, public buses are not considered last-resort forms of transportation, and cycling is not viewed as eco-friendly exercise. Rather, these are usual ways to get around (Shorto, New York Times, 2011). However, because this viewpoint is not typical in South Florida, the success of TDM programs designed to curb parking demand and promote alternatives to single-occupant use of the automobile require improved education of the public. Improving public education and shifting public opinion with regards to transportation requires the use of community-based social marketing (CBSM).

TDM helps to mitigate growing urban congestion and impaired mobility "by encouraging people to substitute public transportation and walking for individual automobile use" (TRB, 2008, p. 1). This kind of behavior must be promoted often enough to have a measurable, beneficial effect on travel conditions (TRB, 2008). Many TDM strategies are used to encourage multiple transport options (described earlier in this memorandum), but several challenges exist to the success of such strategies. These challenges include an excessive parking supply, the perceived ease of driving alone, and various disincentives to using alternate travel modes.

"Public knowledge and attitudes have a major effect on travel behavior" (VTPI, 2010). As a result, marketing must be considered an important component of TDM implementation (VTPI, 2010). TDM marketing is about promoting the benefits of, and changing public attitudes about, alternative travel modes. By gaining a better understanding "of the links between individuals' attitudes, intentions, and behaviors with regard to compact neighborhoods and travel alternatives to the automobile, strategies can be better configured and targeted to help achieve the desired outcomes" (TRB, 2008).

Practitioners in the health, environment and community-based fields have long explored ways to persuade individuals to adopt a range of behaviors. This process has revealed that information alone is usually unlikely to change behaviors (Cullbridge Marketing and Communications, 2010). Therefore, marketing and education may be necessary to improve TDM implementation. Whereas commercial marketing aims to accomplish financial gain, social marketing is "a process that applies marketing principles and techniques to create, communicate, and deliver value in order to influence target audience behaviors that benefit society (public health, safety, the environment, and communities) as well as the target audience" (Cullbridge Marketing and Communications, 2010). Marketing to make behaviors more sustainable is not simply about promotion or advertising alone. Social marketing involves designing the alternative transportation experience – walking, cycling, carpooling and transit - so that it is truly attractive to the audience and meets their needs.

Marketing and education are strategies necessary to balance views and encourage a more coordinated approach to parking and travel demand management. In many parts of the United States, "urban development and parking are intensely controversial issues" (Deakin & Frick, 2009). Parking management has become "central to the debate on whether and how much parking should be provided and at what cost environmentally, out of pocket to the traveler or socially (in terms of increased travel that might cause congestion, safety conflicts with pedestrians and bicycles, etc.)" (Deakin & Frick, 2009). These issues can only be resolved with years of sensitive planning and public involvement (Deakin & Frick, 2009). City officials, residents, merchants, transit operators, and consumers are some of the groups interested in parking management. Without a coordinated approach, a municipality will lack a clear vision and the consistent direction necessary for comprehensive TDM (McCahill & Garrick, 2009).

According to the Victoria Transport Policy Institute (VTPI, 2010), "the most effective TDM marketing programs involve a variety of partners within a community, including public officials, community organizations and individuals who support

transportation alternatives." This statement indicates that TDM Marketing is a strategy that stresses regional cooperation by encouraging people to work together. Effective CBSM emphasizes direct contact among community members and the systematic removal of structural and other barriers to actions, since research suggests that these approaches are often most likely to bring about behavioral change (Cullbridge Marketing and Communications, 2010).

Marketing involves determining consumer needs and preferences, providing useful information to consumers, and promoting the use of specific products or services (VTPI, 2010). Effective marketing also requires "delivering messages to different types of people, with special emphasis on people who are most ready to change" (VPTI, 2010). In other words, marketing is a targeted strategy that utilizes theoretical knowledge about human behavior, including how and why individuals make travel decisions. Commercial marketing has long utilized information to influence consumer demand, and the urban transportation market can adopt similar approaches. Successful social marketing requires an entire process of analyzing the audience and its context, as well as addressing all components of the marketing mix (Cullbridge Marketing and Communications, 2010). The marketing mix consists of the four P's of marketing: "getting the right product, at the right time, at the right place, with the right price and presented in the right way (promotion) that succeeds in satisfying buyer needs" (Table 16, Cullbridge Marketing and Communications, 2010).

TABLE 17 - FOUR Ps OF MARKETING

Product	The travel behavior you are promoting to your audience. For example, cycling to work or shopping (*what do you want them to do?*). This is what you are selling.
	Tangible products or services offered to support this behavior change. For example, tire pressure gauges, showers at work, bike repair clinics, bicycle parking (*how you will help them accomplish the new travel behavior*).
	The benefits the audience will experience as a result of the new travel behavior. For example, time and cost savings, pleasure and fitness (*what they want from the new behavior*). They are *buying* this product.
Price	The monetary and non-monetary costs the target adopters pay and the barriers they overcome to change their behavior. Examples of the price include increased trip time, inconvenience, and safety concerns.
Place	Refers to the locations and environments where your audiences will learn more about, experience and/or continue engaging in the travel behavior. Are these places convenient, safe and pleasant?
Promotion	Ensures that your audiences know what you are offering them, believe they will experience the stated benefits and are inspired to act.

Source: Cullbridge Marketing and Communications, 2010

143

TDM marketing is CBSM, and dependent upon five critical elements. First, the goals and objectives that form the focus of the TDM effort must be established. Travel options and behaviors, and key audiences of this focus must be selected. Municipalities should be as specific as possible in terms of defining the modal changes in transportation behavior that they desire to see. For example, in Miami, the focus might be to promote the use of the Metrorail during Miami Heat games and other special events at the AAA. A key audience to focus on in this case could be residents of neighborhoods along the Metrorail or MetroMover. This audience can include a great diversity of users; people from all throughout the region, including those who live in West Miami or Kendall, can park at Metrorail stations to get downtown.

Second, formative research must be conducted and data gathered in order to identify the barriers and benefits related to this new transportation behavior, or the price of changing this behavior. For example, the schedule for the service may need to be adjusted to address the needs of diverse groups of users – people who leave the game early as well as the larger crowd who leaves at the end of the game. The third critical element of CBSM involves developing and piloting a program to overcome the identified barriers and promote the benefits. Fourth, the program must be implemented across a community. Finally, the program must be monitored and evaluated on an ongoing basis in order to improve its effectiveness over time (Cullbridge Marketing and Communications, 2010). Handbooks to guide successful CBSM have been written and should be consulted for further details regarding the five critical elements of the social marketing process.

Table 19 demonstrates that some people change their behavior simply as a result of being provided with information, but only if barriers to doing the action are relatively low, personal motivation to doing the action is high, and the audience is unaware of the action and its benefits. In many cases, however, people face real barriers to changing their travel behavior. Some people are completely unaware of the existence of travel alternatives and are therefore incapable of changing their travel behavior. Others might be concerned about personal safety, inclement weather, or bicycle theft. Further, as is the case in South Florida, many people enjoy the flexibility and comfort of their cars. People are also influenced by public opinion, including the opinions of family members, neighbors and colleagues, against the use of alternative transportation. These barriers and influences can outweigh the good intentions of those who might otherwise change their travel habits. In these cases, the social marketing intervention approach to behavior change becomes necessary (Cullbridge Marketing and Communications, 2010).

TABLE 18 - THE PLACE OF SOCIAL MARKETING
IN THE CONTINUUM OF BEHAVIOR CHANGE INTERVENTIONS

Intervention approach	Information	Social marketing	Law
Context for intervention	Barriers are low Personal motivation exists Audience is unaware	Some barriers exist Personal motivation exists	Barriers are high Behaviors are entrenched

Source: Cullbridge Marketing and Communications, 2010

Social marketing has developed a strong track record worldwide for its effectiveness at influencing a wide range of behaviors for both personal and public good. Various communities in Canada, the US, Europe and Australia have reduced the modal share of personal vehicle trips by up to 7 percent, as well as overall vehicle miles travelled as a result of this approach. The utilization of social marketing techniques has also helped to significantly increase walking, cycling and transit use (Cullbridge Marketing and Communications, 2010). Improving public education through marketing has the ability to influence transportation choices such as walking and cycling to work, telecommuting, shifting trips to off-peak hours, and influencing the use of car-pooling, public transit and park-and-ride programs (Cullbridge Marketing and Communications, 2010), and can be implemented as part of any TDM program.

Examples

SF*park*, a pilot project of the SFMTA, was developed to utilize new technologies to improve parking in San Francisco. The project is a TDM strategy that utilizes real-time data and demand-responsive pricing to re-adjust parking patterns, making parking easier for commuters to find. New parking meters and sensors were installed across the City through the end of 2010 and the project was launched in April 2011.

SF*park*'s marketing strategy was a coordinated effort. An extensive marketing and advertising campaign was launched to coincide with the project's start up, assuring that the program gained a lot of publicity and media attention. A launch event was held where Donald Shoup, a leading authority on parking management practices, was a speaker. Additional strategies for raising public awareness included newspaper advertising, outdoor advertisements and launch ads, including bus ads and posters. All advertising materials were available for download directly from the SF*park* online website for members of the media or for any community resident. Easy access to

145

advertising materials online assisted in raising community awareness and in the program's promotion.

One highlight of this campaign is its promotion of the benefits of parking management. Highlighting benefits is an important factor in shifting public perception and attitudes about TDM, especially when the majority of the general population is ignorant to concepts like parking management and TDM. In promoting TDM and SF*park* program benefits, key audiences become informed more about the significance and impact of their travel behavior. As a resource for this communication, SF*park* provided a Benefits Sheet via the program's website. The following represent some of the benefits identified: the program helps to make it easier to park, reduce congestion and improve traffic flow, improve transit speed and reliability, improve safety for all road users, and improve air quality. SF*park* markets the idea that, "by reducing congestion, better parking management will benefit everyone – drivers, business owners, transit riders, bicyclists, and pedestrians. This program will help make San Francisco an even better place to work and live" (SFMTA, 2011).

The visual media utilized in the promotion of SF*park*, including its ads and website, is an excellent demonstration of a successfully streamlined campaign. Both the ads and the website are concise, attractive and fun. Further, the website is easy to navigate. Trying to promote something in too many words can prove detrimental and cause people to lose interest. In this case, the website is not too wordy. Making sure to simplify the information also makes it accessible to more people – an important aspect to successful marketing and promotion. "Parking management" and "improving the efficiency of the transportation system" might be foreign concepts to most target adopters. By having an accessible approach to marketing and by making the ads something fun to look at, SF*park* enhanced their publicity and ability to draw attention.

Overall, SF*park* provides an excellent example of a program that executes the five critical elements of CBSM. First, a travel behavior and key focus audience was established. Getting people to park in response to real-time data and demand-responsive pricing was the target behavior of the program and the "product" being "sold". People who drive and park their cars in San Francisco were the key audience. The next critical element of CBSM required identifying the related barriers or benefits of changing the behavior, or the "price" of changing the behavior. By assessing the price, it became possible to take necessary action to remove barriers, promote benefits and add value to the product. The greater the value of the new behavior, the more successful the program would be. Third, a program for the product (travel behavior of focus) was developed and piloted; SF*park* began its pilot phase in the summer of 2010. Real-time parking data was first made available and demand-responsive pricing

implementation began in SF*park* pilot areas (SFMTA, 2011b). In the fourth critical element of CBSM, the program was implemented across a community.

SFMTA is collaborating with the USDOT and FHWA to evaluate SF*park*'s combination of technology and pricing strategy through mid-2012 "to ensure successful City-wide implementation later that year" (SFMTA, 2011b; 2011c). This leads into SF*park*'s demonstration of the fifth critical element, which requires that the program be monitored and evaluated in order to improve its effectiveness over time. The coordinated social marketing approach illustrated by this example can be reproduced in South Florida if new parking management programs are developed and implemented.

LA ExpressPark

In comparison to SF*park*, the Los Angeles Department of Transportation (LADOT) does not appear to have as coordinated of a strategy in marketing their LA *Express*Park program. As a result, *Express*Park may be more useful as an example for how not to promote a parking management program. The LA *Express*Park website is too wordy and the language is less clear and concise. Table 20 compares language from the two programs.

TABLE 19 - SF*PARK* AND LA *EXPRESS*PARK LANGUAGE COMPARISON

Introduction to SF*park*	Introduction to LA *Express*Park
Reducing traffic by helping drivers find parking benefits everyone. More parking availability makes streets less congested and safer. Meters that accept credit and debit cards reduce frustration and parking citations. With SF*park,* we can all circle less and live more.	A 4.5-square mile area in Downtown will support *Express*Park, a one-year pilot program that will infuse technology and demand-based pricing into an innovative parking management strategy. Created with $15 million in grants from the USDOT and $3.5 million in City funds, the project will test ways technology can help the City realize its goals to increase the availability of limited parking spaces, reduce traffic congestion and air pollution, and encourage use of alternative modes of transportation.

Source: SFMTA, 2011; LADOT, 2010

Making information as clear as possible is vital to TDM success, and the way that information is presented to the audience can influence this. SF*park* made sure to

simplify the information on their website, making it easier to read and understand; therefore it is more accessible. Marketing is not just about providing information to those who seek it. This alone will not shift attitudes that impede the desired travel behavior. Successful social marketing involves focusing on specific travel options and key audiences, identifying barriers and benefits specific to that audience and context, and creating a targeted strategy that unites agencies by removing barriers and promoting benefits. LA *Express*Park achieved the first and third critical elements of CBSM by targeting a specific travel behavior and developing a program, but did not do as well at adding value to the behavior change, which is a critical element. In contrast to SF*park*'s coordinated social marketing strategy, the method used in LA is simply to provide information. As described in the previous section, some people will change their behavior by simply being provided with information, but only if barriers to doing the action are relatively low and personal motivation to doing the action is high.

LA *Express*Park could more effectively present their marketing material. By way of the LADOT website, there is a single page dedicated to the LA *Express*Park program, rather than its own navigable site. Nothing is linked to social media for getting the word out. Press releases and advertisements are not made available for the media, and publicity is not followed or documented. An additional setback in LADOT's strategy for LA *Express*Park lies in not drawing greater attention to the *benefits* of parking management. Promoting the benefits makes the *price* of changing one's behavior more valuable. The greater the value, the more successful the TDM program will be (LADOT, 2010). In contrast, publicity was a key aspect of SF*park*. Various communication channels were used and the program's publicity was tracked. The website contains an archive of press clippings available to catalog each time SF*park* was featured in the press. Press releases and advertisements are made available to the media and other agencies, and advertisements can even be downloaded.

LA Metro provides an excellent example of the social marketing of a transit agency that is using public education to raise public awareness of transportation options. It markets its products and services "as if it were a private company bent on turning a profit" (Arpi, 2009). But as previously described, social marketing is not primarily about financial gain; it's about maximizing benefits to society, which in this case include reducing traffic, cleaning the air, and making people's automobile commutes a bit less stressful. This is the idea in Los Angeles, where for LA Metro, "marketing isn't about increasing the bottom line" (Arpi, 2009).

LA Metro put together a team, creating an in-house ad agency known as "Creative Services." The desire to make public transportation cool is the driving force for this marketing and communications team. Making buses appear as an attractive

alternative to cars is an ambitious goal for any transit agency, "but it's especially ambitious in a place like Los Angeles where image and the automobile are everything" (Arpi, 2009). The case in South Florida is similar. Despite this, it is possible to create a presence of alternative modes in auto-dominated cultures. In LA, the Metro bus fleet is colorful and ubiquitous on all major city streets. Improving the visual appearance of alternatives adds value to these modes, encouraging their utilization and promoting desirable travel effects. LA Metro also runs playful ads on billboards inspiring Los Angeles residents to leave their cars at home and opt instead for taking the bus, rail, or carpool (Arpi, 2009).

In 2008, Creative Services at LA Metro were instrumental to the success of a new sales tax in Los Angeles County called Measure R. Measure R is a half-cent sales tax dedicated to financing new transportation projects and programs (Los Angeles County Metropolitan Transportation Authority, 2011), and is expected to generate 40 billion dollars over the next 30 years for improving transit services in LA (Arpi, 2009). Another outcome of LA Metro's marketing and rebranding strategies has been an increase in the use of metro services by discretionary riders, or "those people who have the choice to commute by car or transit", with an increase in ridership from 24 to 36 percent (Arpi, 2009).

Current Application in Project CBDs

There is no current application of social marketing in either project CBD, and the marketing that does exist simply provides information. Online websites have become the primary means of disseminating information to travelers prior to their arrival in the CBDs. SFCS relays information about different TDM strategies in the area, and Fort Lauderdale's DTM and the MPA have websites contain information on parking facility locations, rates, and payment options. Additionally, the MPA maintains an online blog and sponsors several events that educate the public about Miami's parking issues and where to find information. Phone numbers for both agencies are also available to assist users. Although there is currently no smart phone application available, the MPA provides the best example of coordinated marketing for parking management in South Florida. However, MPA does not promote TDM or the use of alternate modes of transportation and related social benefits, therefore their methods cannot be described as social marketing.

The Miami-Dade MPO operates the South Florida Vanpool Program, with support from the Broward and Palm Beach County MPOs. Currently there are 206 vanpools in the region. In future vanpool marketing campaigns, outreach efforts will focus on federal and private employees located in Downtown Miami. Efforts to promote vanpools in the Downtown Fort Lauderdale area will also begin; Fort Lauderdale has a

need for alternative modes of transportation due to the lack of direct rail access (J. Guerra, personal communication, August 23, 2010).   By targeting a specific travel behavior and audience, the Miami-Dade MPO has accomplished one critical element of successful CBSM.   However, successful CBSM is dependent upon all five critical elements, not just one.

An assessment of social marketing implementation by other organizations in South Florida further reveals that the application of true social marketing in Miami and Fort Lauderdale CBDs is non-existent. Beyond the usual transportation agencies, many popular venues in the region inform visitors about how they can arrive to their business by transit.   For all venues assessed, the information is provided through the organization's website. In Miami, via their website, the AAA states that "getting to the AAA by public transportation is easy"(AAA, 2011).   However, information for the Metrorail, Metromover and Enhanced Bus Service requires using the "Directions and Parking" page of the site instead of the "Parking and Transit" page.   In this example, arriving by transit is not ideally encouraged. Informing visitors about how to arrive by transit is another example of simply providing information. The same scenario exists for all other popular venues located in the Miami and Fort Lauderdale CBDs.

Evaluation

Social marketing programs do not increase the cost of vehicle-based trips and they do not decrease the need to make trips, but they may create incentives for travelers to use alternative modes of transportation. Additionally, social marketing does not directly subsidize or decrease the price of alternative modes of transportation to the final user. However, the strategy may decrease the demand for parking by promoting a modal shift. According to the VTPI (2011), improved user information, public education and marketing typically create a five to fifteen percent reduction in parking requirements.

Over time, a sustained investment in marketing increases transit ridership. Increased ridership leads to increased revenue and, ideally, an increase in service to match the new demand.   Therefore, this strategy may promote the development, expansion, or upgrading of the infrastructure needed to supply alternative modes of transportation.   It may also promote financial support for the regular operation of alternative modes of transportation; however, this may only be true for transit and bicycle rental facilities.   Social marketing may also encourage better coordination among different alternative modes of transportation. This strategy, however, does not directly affect factors that can improve the provision of service for alternative transportation.

By encouraging a more balanced view of the transportation system, social marketing provides many social benefits to society. This strategy tends to reduce vehicle traffic; as a result, the main social benefits include reductions in congestion, accidents, energy consumption, and pollutions emissions (VTPI, 2011). Additional benefits may include improved traffic flow, transit time and reliability, improved safety for road users, and improved air quality. Additionally, benefits include "increased understanding and appreciation of TDM, increased public support for TDM strategies, and increased effectiveness of TDM efforts" (VTPI, 2011). By increasing public knowledge and acceptance of transportation alternatives, marketing also impacts equity (VTPI, 2011). Improved TDM programs increases equity and "tends to benefit lower-income and transportation disadvantaged people by improving their mobility options, increasing access for non-drivers, and reducing the stigma often associated with alternative modes" (VTPI, 2011). However, if the infrastructure for alternative transportation is not enhanced for added safety, an increase in utilization may pose safety risks for users and result in added social costs. Nonetheless, the social benefits of the strategy generally outweigh the social costs.

Marketing does provide a means for municipalities to raise money. As previously stated, a sustained investment in marketing over time can increase the number of people utilizing transit or other modes, and increased ridership leads to increased revenue for agencies providing these services. However, the case of increased revenue tends to only be true for transit and bicycle rental facilities. Moneys raised can be allocated to the same agency that generates or collects them, and can also be earmarked for capital improvements or for the regular operation of transit and transportation facilities. However, marketing may not always be a financially self-sustainable strategy; marketing programs depend primarily on support and funding from agencies or businesses (VTPI, 2011).

Social marketing is not itself a politically sensitive strategy, but issues related to parking and urban development can be politically sensitive topics. Generally, since marketing TDM promotes a balanced and more efficient transportation system, stakeholders would see positive effects from the implementation of this strategy. Individuals or organizations that gain revenue from private and/or public parking are the stakeholders that would likely see their interests negatively affected by this strategy. As a result, marketing programs should be developed in cooperation with all major stakeholders, including government agencies, business organizations, non-profit organizations, and participant groups (VTPI, 2011).

As a result of this cooperation, stakeholders may have a direct say in decision-making related to social marketing, but may not be able to block its implementation.

Stakeholders that would like to see the positive effects of its implementation have more reason to expedite marketing programs. This strategy is utilized in order to make other TDM programs clear and intelligible in a way that is easy to explain and 'sell' to the general public. This approach does not require a new institutional framework; jurisdictions and functional government agencies have governability over the implementation and results of the marketing strategy. This strategy is compatible with current practices and policies and can be implemented as part of any TDM program (VTPI, 2011). The implementation of social marketing does not require the enactment of new laws or changes to existing ones. This strategy is also very flexible and can therefore change according to variations in context.

Marketing is a strategy currently being implemented within both Miami and Fort Lauderdale. Most agencies located within both the Miami and Fort Lauderdale CBDs employ marketing and communications specialists. However, it is not apparent that the strategy is being implemented to the standards suggested in our recommendations. When it is not solely providing information, marketing is an effective strategy for improving the success of TDM. The five critical elements of successful community based social marketing should serve to guide the design, production and implementation of specific TDM programs for agencies in South Florida. Successful social marketing practices must work diligently to remove the barriers and add value to the desired change in travel behavior. The implementation of social marketing is dependent upon the development of specific TDM strategies; therefore it is susceptible to implementation in the medium or long term. Uncertain changes in revenues or costs faced by an agency can affect the financial sustainability of this strategy in the future, which may reduce its overall desirability. However, the overall priority of implementing social marketing in both Miami and Fort Lauderdale is high.

Recommendations

Previous memoranda have identified a lack of sufficient TDM strategies being implemented in both locations (see Tables 5 and 6). Therefore, it is first necessary to create specific programs to be implemented. To ensure TDM success, it is necessary to identify *specific* travel behaviors and target audiences of focus before TDM programs can be created, implemented, and marketed to the public. Whenever possible, existing programs should be continuously refined by conducting research on the focus, key audiences, and context of travel behaviors. Psychological barriers to action of the behavior, and positive motivators for using alternative transportation, should be identified before creating marketing messages. Before programs are piloted, focus groups can provide feedback about the public's opinion, and create tipping points for getting the word out about the pilot program. Agencies should also work to implement

information campaigns about local options for alternative modes of transportation. It is also important for the elected officials to stand behind these educational campaigns and use their platforms as additional means of information dissemination.

Improving relations with the media is one way to ensure that messages are being relayed to the public in the desired manner. Agencies can create the stories and work closely with the media to get them out to the public. Press releases about new TDM programs should be written by a public relations or marketing and communications employee at the agency and sent directly to professionals in the media. Good relations between agency and media should be consistently maintained, and establishing partnerships with other organizations besides the media is also beneficial. Partnering with organizations that share similar TDM interests and goals can help to reduce barriers, increase benefits, improve the credibility of your message, and facilitate access to your audience (Cullbridge Marketing and Communications, 2010).

It is within the purview of FDOT to educate the public about transportation alternatives (Florida Statues, FS 334.044). This responsibility includes "the purchase of promotional items as part of public information and education campaigns for the promotion of alternatives to single-occupant vehicle travel" (Florida Statues, FS 334.044). Parking supply and demand management is a major aspect of promoting alternatives to single-occupant vehicle travel. Therefore, the FDOT should contribute to the social marketing of parking supply and demand management related programs and strategies. Contributions can be made through the provision of funds and other resources necessary to the successful implementation of CBSM campaigns.

H. INSTITUTIONAL COORDINATION OF PARKING, TRANSPORTATION AND LAND USE

This section summarizes the best practice strategies for effective multimodal coordination between agencies. City agencies in the CBDs should coordinate with other local, county, regional and state agencies to ensure that land use and transportation activities are consistent with parking supply and demand management strategies. A transit user should be able to move seamlessly through a transit network even though funding jurisdictions are crossed. This strategy promotes the goal of a unified planning effort to promote multimodal options for the diversity of users, tourists, workers, and residents that travel to, from, and around the CBDs.

Description

Shoup (2005) writes that "[p]arking affects both transportation and land use, but its effects are often overlooked or misunderstood. Many people see urban problems – congestion, pollution, decay, and sprawl – but even the most ferocious critics of cars often fail to connect these problems with parking policies" (p. 3). As parking is inherently related to transportation systems and land uses, it is uniquely situated between them. Coordination regarding parking practices, procedures, and regulations, therefore, must be considered. Two main types of institutional coordination exist and must be considered when evaluating parking supply and demand management. First, parking, land use, and all aspects of the transportation system must be coordinated. Second, municipalities and jurisdictions involved with parking rules and regulations must coordinate with other organizations involved in land use and transportation systems planning. Coordination between and among agencies can be characterized as internal, horizontal and vertical. Internal coordination refers to coordination between agencies in the same organization. Horizontal coordination refers to coordination between adjacent jurisdictions at the same level of government. Vertical coordination refers to coordination between different levels of government with overlapping jurisdictions (Burby & May, 1997). The need for coordination among agencies has already been described for various strategies (e.g., transportation and land use, commuter incentives for alternative modes of accessibility, and design and technology).

Parking is a component of both the transportation system and a type of land use. McCahill and Garrick (2009) state that "not only does parking policy affect travel behavior, but parking demand is indicative of travel behavior in a city. Parking influences not only how people travel, but also how a city uses its land, so the impacts of parking on urban form and travel behavior are compounded" (p. 4). Parking, as they describe it, is a part of the greater transportation system that affects how people use the

system. As a land use, parking can be considered a specific use when it is the terminal capacity for vehicles, or it can be considered an accessory use when it is secondary to another land use (e.g. office, residential or commercial). In general, land use planning and parking has been primarily seen as a responsibility of local government. Given the intimate connection between parking and transportation system outcomes, however, there are strong arguments for a stronger role for other transportation agencies in parking supply and demand management. An overabundance of parking can result in congestion due to cruising for parking (Litman, 2011). The underpricing of parking affects travel costs by influencing the amount of travel, vehicle ownership, and shifts between modes of travel (Steiner et al, 2010a). The fact that this study was funded by the FDOT further stresses the ambiguity of the relationship between parking and the other elements of the transportation system, and the need to consider parking as an integral part of transportation planning. This ambiguity reinforces the importance of coordination at all levels of government.

Regardless of where parking fits as a land use category, it is definitely a part of efforts to coordinate land use and transportation (e.g., the smart growth movement, sustainable development and new urbanism), and encourage the well-being and livability of communities (FHWA, 2011a). In light of efforts to connect land use and transportation, coordinating parking efforts with other land use and transportation, decision-making processes and procedures is a logical step. This coordination, however, is made difficult due to the number of governmental agencies and private organizations involved in decision-making. Coordination of transit and parking can offer substantial savings in land and development costs by reducing the demand for downtown parking and offer residents, workers and visitors greater choice about how to travel to, from, and within the downtown. In order to coordinate these policies, however, parking managers and transportation professional at all levels must work together.

The federal government recognizes the need for coordination between land use and transportation planning in Title 23 of the U.S. Code, Sections 134 and 135, which also establishes the requirements for MPOs. MPOs are encouraged to consult with other planning officials to coordinate planning processes (U.S. Code). Discussions of integrated land use and transportation, including parking, can involve various city and county departments, MPOs, and state transportations agencies. Title 23 requires "communication and interaction" between those involved in land use and transportation (FWHA, 2011). Encouraging discussions among those who make land use and transportation decisions, on multiple levels, can be seen as a part of the MPOs' mandate, to coordinate planning across regions and throughout the state, which, in turn, will "encourage and promote the safe and efficient management, operation, and development of … transportation systems" (U.S. Code § 134). Although the federal

code does not discuss parking as a specific aspect of land use and transportation coordination, the impact of parking on the transportation system may justify greater coordination between MPOs and local governments as a part of congestion management, TSM, and TDM strategies.

Examples

San Francisco

The City of San Francisco is often considered to be one of the most innovative cities with respect to coordination of parking and transportation. SFMTA manages all transportation concerns within the city and county, including pedestrians, bicycling, transit, traffic, parking, and taxis (San Francisco, 2010). The organization is one of the few transportation entities in the country that controls both transit and parking and is committed to transit improvements, parking management, and TDM strategies. SFMTA, along with the FHWA and USDOT, are working on an Urban Partnership Agreement and Congestion Reduction Demonstration Program that "optimizes the use of existing parking resources" (SF*park*, 2011). SFMTA controls the Municipal Railway (MUNI), which includes local and express buses, light rail, a historic streetcar, and cable cars, and connects to other transit systems in the region. The city has implemented a Livable Streets Plan, a bicycle program and plan, and SFpark, all of which are under the same agency and serve to improve coordination within the city. San Francisco is also served by Caltrain commuter rail, a heavy rail system, and BART, which connects to the MUNI Metro in four stations in downtown San Francisco (Bay Area, n.d.).

San Francisco, which has a combined city-county government, is larger than either of the cities in the study area, although the county population is slightly smaller and the metropolitan area is fairly comparable. According the 2000 Census, 31 percent of workers in San Francisco County used public transit to journey to work, while only 2.3 percent and 5.2 percent of workers did so in Broward and Miami-Dade Counties, respectively. In San Francisco County, 40.5 percent of workers drove alone to work, while 80 percent did so in Broward County and 73.8 percent in Miami-Dade County. According to Jay Primus, Manager of SF*park*, about 60 percent of work-related trips into the San Francisco CBD are on transit, and 95 percent of the city and county populations are within ¼ mile of transit service (J. Primus, personal communication, Sept 29, 2010). The transportation network in San Francisco is well-connected and the residential density is relatively high, which supports the use of transit throughout the city.

Greater efficiency and coordination can result by having one agency largely control activities relating to transportation. San Francisco's commitment to transit,

parking management, and TDM strategies can be seen in their mode split (i.e., the travel modes used by travelers). Overall, the city is considered to be on the cutting edge of coordinated planning of parking and transit, which is demonstrated through the Urban Partnership Program, as well as their many parking program efforts. City agencies can work together with fewer other agencies to coordinate transportation and parking because of the organization of SFMTA. As a result, workers in San Francisco use transit more frequently to travel to work than in either Fort Lauderdale or Miami.

Washington, D.C.

Washington, D.C. (DC) is unlike many other cities in the U.S., due to its position as the nation's capital and associated level of federal control. DC provides a different model of institutional coordination that is relevant to Miami and Fort Lauderdale. The DC CBD has a population of about 15,000 people and employment of 382,400. The overall city population is just over 600,000. The DC metro area, according it its MSA, is similar to the Miami and Fort Lauderdale's and is located about 38 miles from another large city (Baltimore, MD).

The Washington Metropolitan Area Transit Authority (WMATA) and the District Department of Transportation (DDOT) address transit and parking issues in DC. WMATA is a quasi-governmental agency funded by the federal government that forms a regional partnership between DC and the states of Maryland and Virginia (N. Abass, personal communication, September 27, 2010). Overall, WMATA operates a five line, 86 station, heavy rail system (Metrorail) and 319 bus routes (Washington Metropolitan, 2010). WMATA also runs a downtown circulator, but it does not interface with parking (N. Abass, personal communication, September 27, 2010). Integration with park-and-ride or other WMATA facilities is done outside the DDOT core by heavy rail and local and express bus. DDOT is in charge of the management and maintenance of transportation infrastructure within its boundaries, and on transit service issues, such as reduced-fare programs, DDOT coordinates with WMATA (DDOT, 2010).

WMATA acknowledges a lack of institutional coordination between certain jurisdictions and agencies, as well as between parking and transit. WMATA has little communication with outside jurisdictions (N. Abass, personal communication, September 27, 2010). Parking management efforts, at the time of communication, were not coordinated with transit, but performance-based parking pilot projects and neighborhood parking plans were under development. Currently, DDOT is implementing "Livability Studies" to assess the transportation system elements and develop plans to "improve and proactively manage transportation resources; promote safe access and travel to, through and within the area for all modes of travel; and,

ensure that transportation contributes to existing neighborhood assets and goals" (District Department, n.d.). Despite the lack of coordination, the use of transit, including park-and-ride programs, is high. According to WMATA, 42 percent of those working in DC and urban Arlington County, Virginia, commute by transit (Washington Metropolitan, 2010), and "many occasional riders park and board at terminal stations and, overall, passengers that need to go to the CBD from the outskirts of the Washington region are more likely to use park-and-ride facilities" (N. Abass personal communication, September 27, 2010). There are strong incentives to use transit because most meters in the DC area are only available for two hours or less and some garages cost $15 a day (N. Abass, personal communication, September 27, 2010).

Washington, D.C. is an example of a place that has acknowledged it needs to improve its institutional coordination between agencies and jurisdictions. Through DC's livability programs, the city promotes coordination, and considers parking to be an integral part of plans for transportation alternatives. In addition, the Maryland Department of Transportation acknowledges the relationship, geographically, between Baltimore and DC. The Maryland Transit Administration (MTA) has 73 bus routes (local, limited stop, express, and commuter) that run throughout the region, including routes to Baltimore and DC; Metro, a subway system in the Baltimore area; light rail between the Baltimore area and BWI airport; and MARC, a train service that connects Baltimore and DC, and also links to West Virginia. Therefore, the activities of the MTA provide a model of a system that connects between two downtowns – Baltimore and DC - and that extends beyond the region to West Virginia. These transit options are heavily used because of the high price of parking in the DC CBD and the distances covered.

Denver

Denver is a consolidated city-county with a population of just over 600,000 people (U.S. Census, 2010). Denver is currently focused on promoting livability, specifically through its "Living Streets" program, which encourages places that are safe, efficient, and open to multiple modes of travel, and destinations (Denver Living Streets, n.d.). Denver is part of the RTD that includes the bus and light rail transportation services for all or part of 8 counties, including Boulder (RTD). RTD not only provides transportation services, but they provide contact information on their website to non-RTD transit systems in the region. As a regional agency, RTD connects multiple cities and allows for intermodal transfers between various modes of transportation.

Denver and the RTD are currently developing key components of their transportation system, including Denver Union Station, a multimodal hub with rail (light, commuter and Amtrak), buses (regional, express and local), shuttles, a Downtown

Circulator and taxis, and bicycle and pedestrian facilities (Regional Transportation, 2011). In addition, Denver promotes TOD to create places that fit with, and encourage, their livability goals. Denver is one of the leaders in TOD activity; TOD, like parking, requires connection and communication between land use and transportation.

Blueprint Denver, which is a supplement to the City's Comprehensive Plan, specifically addresses integrating land use and transportation, and includes areas of change, stability, multi-modal streets, and mixed use development (City of Denver, 2011). The City is working with other agencies, such as the Denver Housing Authority, to create partnerships along corridors so that TOD can be successfully implemented (Center for Transit, 2011). Links between Denver and surrounding cities, including Boulder, which is approximately 30 miles away, are key components of these plans. Planning for TOD includes coordinating land use planning with transportation, particularly the local transit system.

As Denver expands its transportation network, including a mobility hub in the downtown area, it is also exploring the connections between transportation and land use and developing partnerships between agencies. For example, in the West Corridor project, a working group has been established between the City of Denver, the City of Lakewood, the Denver Housing Authority, and Metro West Housing Solutions. The West Corridor Working Group has been working with the Center for Transit Oriented Development to study the best strategies for implementing TOD in the area.

Denver produced a Strategic Parking Plan (SPP) in 2010 that addressed the needs of parking within the greater context of other planning efforts. The SPP specifically identified the need for parking management strategies, including the necessity of paying attention to the different types of neighborhoods and their associated needs, and the overall goal of balancing parking with the city's other goals of livability and economic development. The SPP is coordinated with the Comprehensive Plan, Blueprint Denver, the Strategic Transportation Plan, and Greenprint Denver. Other highlights of the plan include acknowledging the relationship between parking and land use, managing parking as an asset, and creating a pilot Area Management Program. While the SPP is a document that serves to recommend future work, it presents a uniform basis of planning for, identifying, and confirming the need to coordinate with specific agencies, and clearly presents parking as practice that involves both land use and transportation, as well as city, county, and regional planning organizations. Denver has a current culture of coordination, which allows the city to have strong levels of institutional coordination.

The case of Denver and the surrounding area provides an example of

coordination between cities and a region as a whole, specifically in the context of transportation planning. A large regional transportation entity connects the area vertically and horizontally, which acknowledges and provides information for those transit systems that do not directly interact with it. The city planners in Denver work on land use policies and programs that support the transportation activities and work towards mutual goals. Finally, parking is acknowledged and goals are set to include parking supply and demand management strategies with other coordinated land use and transportation planning initiatives.

New Jersey Department of Transportation and New Jersey TRANSIT

The New Jersey Department of Transportation has established a strong partnership with NJTransit in determining the state needs for mobility. This collaboration is evidenced by the high priority given to transit and other smart growth initiatives in the New Jersey LRTP (NJDOT, 2008). One of the proposed strategies for integrating transportation and land use is to establish partnerships at all levels of government with the private sector in order to promote TOD and redevelopment at transit stations (NJDOT, 2008). The NJDOT works closely with the state's eight Transportation Management Associations to complement NJ TRANSIT's bus and rail services with locally supported and managed services, and to reduce travel demand on the roadways (NJDOT, 2008). In addition, NJ TRANSIT and NJDOT are working together to improve bus service through 2030 and beyond using the following strategies:

- Implementing a Bus Rapid Transit (BRT) system in the US Route 1 corridor;
- Working with state and local traffic engineers to enable buses to compete with autos by traveling at posted speed limits at all times;
- Providing preferential treatment for buses on state and local roads to permit them to bypass congestion;
- Beginning work early on short pieces of roads in urban areas where buses now get stuck in local traffic;
- Working with counties and municipalities to seek other opportunities to provide improved bus services, including possible implementation of BRT systems;
- Creating additional multimodal park-and-ride lots, and expand capacity at existing lots;
- Improving pedestrian and bicycle access to stations; and
- Prioritizing investments in the existing public transit system (NJDOT, 2008).

In order to implement better coordination of transportation and land use, the

160

NJDOT and NJTransit recommend:

- Changes to statutes for consistency with the smart growth principles of the State Development and Redevelopment Plan (SDRP) and the State Planning Commission's Plan Endorsement process;
- Changes to municipal land use law to require circulation elements in municipal master plans and to establish smart growth criteria for these elements;
- Revisions to the State Highway Access Management Act to be multimodal and support the SDRP;
- Revisions to the Roadway Design Manual to recognize community context
- Adoption of multimodal corridor management approach with state, regional, county and local partners; and
- Identification and prioritization of corridors in coordination with the MPOs (NJDOT, 2008).

One of the ways that the NJDOT coordinates multimodal planning is through bi-annual Transportation Coordinating Committee meetings. This effort developed an approach to improve director-level coordination of the various transportation agencies in New Jersey. "It also included the identification of a Corridor Management approach to efficiently manage the multimodal transportation facilities within a given geographical area or corridor" (NJDOT, 2008: 4-5). The NJDOT recognizes that many of the state's smart growth and transit goals require partnerships with municipalities, elected officials, citizens, and the private sector to be successful (NJDOT, 2008).

Current Application in Project CBDs

To some extent, this strategy is currently being implemented by the CBDs. Both Fort Lauderdale and Miami have requirements in place so that agencies working on parking can coordinate with each other, as well as those entities involved in related areas. Within each jurisdiction, there is an existing level of communication, which is further reflected in how they each address parking in the context of land use and transportation planning. The challenge with coordination is that, as a strategy, it is an ongoing process through which various individuals and organizations work together to develop trust and working relationships that result in successful policies, projects and programs. Coordination also takes place between and among multiple agencies - from state to regional to local – who have different responsibilities related to parking, land use regulation, and transportation at different scales of responsibilities (e.g., downtown, city, county, region, state). There is further work that can be done to improve institutional coordination between agencies addressing different aspects of coordinating parking, land use and transportation.

Many levels of government act to affect parking, transportation and land use in the project CBDs. Figure 14 depicts the parties involved. These parties range from state agencies with responsibilities in both Miami-Dade and Broward Counties – South Florida Regional Transportation Authority, South Florida Regional Planning Council, Florida Rail Enterprise, the Turnpike Enterprise, and the Southeast Florida Transportation Council – to regional agency with a state or federal mandate to departments in the respective cities that address transportation, parking, land use planning or matters affecting the downtown.

FIGURE 14 - MIAMI – FORT LAUDERDALE AGENCIES AND GOVERNMENT BODIES

City of Miami Office of Zoning Planning Department Public Works Department Community Redevelopment Agency	City of Fort Lauderdale Planning & Zoning Public Works Department Community Redevelopment Agency Downtown Trans. Management Assoc.
Miami Parking Authority (MPA)	Department of Transportation and Mobility
Downtown Development Authority (DDA)	Downtown Development Authority (DDA)
Miami-Dade County Miami-Dade Transit (MDT) Department of Planning & Zoning Public Works Department	Broward County Broward County Transit (BCT) Planning & Redevelopment Division Public Works Department
Metropolitan Planning Organization	Metropolitan Planning Organization
Southeast Florida Transportation Council	
Florida Department of Transportation District VI	Florida Department of Transportation District IV
Florida Rail Enterprise	
Florida Turnpike Enterprise	
Miami-Dade Expressway Authority (MDX)	
South Florida Commuter Services	
South Florida Regional Transportation Authority / Tri-Rail	
South Florida Regional Planning Council	

Source: Adapted from M. Cahill, personal communication, May 3, 2011

The agencies within each city have the most direct responsibility for regulating land uses, parking supply and demand management, and making decisions about the

162

local transportation system. The regional and state agencies more directly affect the funding for specific transportation projects, provide or coordinate regional transportation services, ensure a safe, viable and balanced transportation system, coordinate across agencies, and encourage and promote the development of multimodal transportation alternatives. The regional and state agencies, therefore, have direct responsibilities for some aspects of the transportation system, but indirect responsibilities for parking supply and demand management, through coordination, review, permitting, and funding of parking, transportation, and land use-related projects.

Coordination within Each City

Each city has several departments and divisions, with slightly different names, that address parking, transportation and land use in the project CBDs; these include Planning and Zoning, Public Works, the Downtown Transportation Management Association (TMA) (Ft. Lauderdale only), Community Redevelopment Agency (CRA), DTM/Parking Authority, and the DDA. The DDAs work with city and regional agencies and the private and non-profit sector to ensure the economic health and vitality of the downtown. Planning and Zoning prepares the local government comprehensive plan, including the land use and transportation elements, and review proposals for development. The DTM in Ft. Lauderdale and the MPA manage on-street parking and several parking garages in the respective downtowns. Among the duties of the Public Works Departments is the maintenance of local streets and other transportation-related activities throughout each city and the CBD. The Downtown Ft. Lauderdale TMA is a non-profit organization who coordinates with the DDA and DTM to achieve their mission "to provide convenient, accessible, and reliable transportation in the advancement of economic vitality, a clean environment, and support of our community" (DFLTMA, 2011).

The respective CRAs prepare plans of the redevelopment of specifically designated redevelopment areas; improvements are funded through tax-increment funding that is collected within these districts. The City Departments, the DDA, and the CRA coordinate with their respective county organizations on issues related to transportation, land use and parking. Some of the departments, such as planning and zoning and public works, have similar responsibility for unincorporated parts of the county. In each county, a transit agency – Miami-Dade Transit (MDT) and Broward County Transit (BCT) – has responsibility for providing transit between the project CBDs and the rest of each county.

In Broward County, BCT operates buses throughout the County, and also provides links to the Miami-Dade and Palm Beach county systems. 18 municipalities in

the County are partnered with BCT, including Fort Lauderdale (Broward County Transit, 2011).   BCT also has the responsibility of coordinating transportation planning. According to the Broward County Code of Ordinances, Section 15.11, the functions and responsibilities of BCT include:

- Coordinate the planning, management, implementation, equipping, construction, operation, and maintenance of a unified, countywide transit system that improves mobility and serves community needs, including special transportation programs for seniors and the disabled.
- Cooperate with adjoining counties in developing seamless connectivity to regional transit and transportation programs and alternatives.
- Coordinate with municipal, county, regional, and state governments, businesses, and human service agencies to ensure a comprehensive transportation services system to address the mobility needs of seniors, the disabled, and the economically disadvantaged residents of Broward County.
- Coordinate activities with all related planning and advisory boards (Broward County Code of Ordinances, Section 15.11. - Functions; Responsibilities).

The Miami-Dade County Code of Ordinances does not give MDT the same responsibilities of coordination as Broward County requires of BCT. MDT's function is to plan and manage the transit routes, transit schedules, operations and maintenance of the fleet, and provide public transportation to the physically disabled (Miami-Dade County, 2011d). The County Manager has the duty to provide the administrative direction and supervision of the Miami-Dade Transit Agency. The Director of the Transit Agency can propose regulations that are necessary to perform their duties to the County Manager (Miami-Dade County, 2011d).

Miami-Dade Transit is the 14th largest public transit system in the USA, and the largest transit agency in the state of Florida.   MDT's system consists of four major components.   The Metrobus fleet connects most areas of Miami-Dade County. Metrorail, an electrically-powered, elevated, rapid-transit system, connects Kendall to Medley. Metromover, a 4.4-mile elevated people mover, circulates around the Miami CBD, Omni and Brickell areas.   Special Transportation Service (STS), is provides service to people with disabilities unable to use regular transit services.   Currently, Miami-Dade Transit records over 326,000 daily (weekday) boardings on this unified system. STS daily average is approximately 5,000 (MDT, 2011b).

Coordination with Regional and State Agencies

The City agencies coordinate transportation planning with regional and state agencies, including their respective MPOs, the Southeast Florida Transportation Council, SFRTA, the South Florida Regional Planning Council (SFRPC), the Florida Rail Enterprise, and the Florida Turnpike Enterprise, and their respective FDOT District Offices (District IV for Fort Lauderdale and District VI for Miami). For the most part, these agencies have less direct responsibility for parking in the project CBDs; however, as is described below, their activities related to the operations of the transportation system and the provision of multimodal transportation could include activities related to parking supply and demand management in the project CBDs.

An MPO is a federally mandated and federally funded transportation policy-making organization run by representatives from local government and governmental transportation authorities. MPOs are composed of officials representing the various municipalities and agencies in a given urban metropolitan area who have responsibility to adopt LRTPs, Transportation Improvement Projects (TIP) and other functional plans. MPOs are advised by technical and citizen committees regarding the plans and programs of the MPO. In Miami-Dade County the MPO Governing Board receives advice from the Citizens Transportation Advisory Committee (CTAC), the Bicycle Pedestrian Advisory Committee (BPAC), the Transportation Aesthetics Review Committee (TARC), and the Freight Transportation Advisory Committee (FTAC) (Broward MPO, 2011b). In Broward County, the MPO is advised by the Technical Coordinating Committee (TCC), Community Involvement Roundtable (CIR), and the Broward County Coordinating Board for Transportation Disadvantaged Services (BCCB) (Broward MPO, 2011a).

The Broward MPO board is comprised of 19 voting members including representatives from the SFRTA/Tri-Rail, the Broward County School Board, three Broward County Commissioners and representatives from five districts in the county. The MPO is responsible for transportation planning and funding allocation in Broward County. The Broward MPO promotes the "cost-feasible partnering among Broward cities and adjoining Counties to maximize opportunities for enhancing and maintaining an affordable, efficient transportation system". The Broward MPO supports establishing a dedicated revenue source to fund transportation projects in Broward County with emphasis on a significant expansion of transit (Broward MPO, 2010).

In Miami-Dade County, the MPO includes all thirteen county commissioners, five elected officials for each of the cities with a populations over 50,000, a representative from the unincorporated part of the county, a member of the Miami-Dade Expressway

Authority (MDX) and a member of the Miami-Dade School Board. Two non-voting representatives of the FDOT also sit on the MPO Board (Miami-Dade MPO, 2011). The Miami-Dade MPO uses a distinct structure to enhance coordination between the MPO governing board and the Board of County Commissioners. Their role "tends to facilitate the process of advancing from plans to implementation of transportation projects (Broward MPO, 2011a). Some of the key interlocal elements of the Miami-Dade MPO are that they can enter into interlocal agreements, as well as contracts or agreements to utilize staff resources with local and/or state agencies. They may also enter into agreements with the FDOT, operators of public mass transportation services (Broward MPO, 2011a).

The Miami-Dade and Broward MPOs coordinate planning efforts through the South East Florida Transportation Council (SEFTC). The SEFTC was "created under Florida Statutes, Chapter 339.175, to serve as a formal forum for policy coordination and communication to carry out regional initiatives agreed upon by the MPOs from Broward, Miami-Dade and Palm Beach Counties." The organization coordinates in the following areas: regional LRTP covering the tri-county region, regional project prioritization and selection process, regional public involvement, and performance measures to assess the effectiveness of regional coordination. Since its inception in 2005, the SEFTC has adopted: regional goals and objectives, regional corridors of significance, regional LRTP, and a list of projects for the Transportation Regional Incentive Program (TRIP) (SEFTC, 2011).

The SFRTA, originally called the Tri-County Commuter Rail, operates Tri-Rail – a commuter rail service that operates along a ROW does not go directly into either CBD. Tri-Rail operates shuttles that connect the stations to downtown areas. The original purpose of Tri-Rail was to provide interim commuter rail service in the South Florida Rail Corridor. In 2003 it became a tri-county public transit authority. SFRTA was created to expand cooperation between Tri-Rail commuter rail services (Tri-Rail) and the transit operators and planning agencies of Palm Beach, Broward, and Miami-Dade Counties. SFRTA's mission is to "coordinate, develop and implement a viable regional transportation system in South Florida that endeavors to meet the desires and needs for the movement of people, goods and services" (SFRTA, 2011).

The SFRTA's governing board is composed of representatives from the Governor's Office, FDOT, and Broward County; Southeast Florida Transportation Council, Florida Rail Enterprise; Florida Turnpike Enterprise; and the South Florida Regional Planning Council. SFRTA coordinates with three south Florida MPOs: Palm Beach MPO, Broward MPO, and Miami-Dade Urbanized Area MPO. SFRTA is also a part of the Long-Range Plan Committees of the three counties on a project-by-project

basis. Coordination with municipalities is also done on project-by-project basis and primarily through the DDAs of those municipalities (J. Quinty & E. Zahn, personal communication, August 9, 2010). SFRTA works extensively with the Miami-Dade, Broward, and Palm Beach MPOs. They also coordinate with the SEFTC. Coordination with municipalities is primarily done on a project-by-project basis with the DDAs. The Miami DDA and Fort Lauderdale would like better connectivity of SFRTA rail stations to the project CBDs (E. Zahn & J. Quinty, personal communication, August 9, 2010).

The SFRTA has several powers that allow it to function as a key player in the transportation planning including the ability to develop and provide feeder transit service to or from stations within or across counties and to lease, rent, or contract for the operation or management of any part of transit system or facilities including feeder service and concessions. SFRTA can coordinate with other governmental entities and to contract with other governmental agencies, including the Department of Transportation, the Federal Government, regional planning councils, counties, and municipalities and to enter into joint development agreements.

SFRTA has to power to accept funds from other governmental sources, and to accept private donations (F.S. Chapter 2003-159), yet they are reliant on the state and neighboring counties for most of their funding. The legislation that created the SFTRA requires that "Palm Beach, Broward and Miami-Dade Counties must each contribute $2.67 million annually beginning on August 1, 2003, and the committee substitute provides these funds may come from each county's share of the ninth-cent fuel tax, the local option fuel tax, or any other source of local gas taxes or nonfederal funds available. In addition, the legislation authorizes the levy of an annual license tax in the amount of $2 for the registration or registration renewal of each vehicle registered in the area served by the SFRTA, upon approval by referendum from the registered voters in the county. The legislation specifies counties served by SFRTA must continue to dedicate $1.565 million to the SFRTA as they were dedicated annually to Tri-Rail, and the $2.67 million contribution is in addition to these funds."

The FDOT has the greatest ability of any of the regional and state agencies to coordinate multimodal transportation planning. According to FS 334.044, the FDOT's powers and general duties of the FDOT include:

- To assume the responsibility for coordinating the planning of a safe, viable, and balanced state transportation system serving all regions of the state, and to assure the compatibility of all components, including multimodal facilities. (FSA §334.044(1));

- To enter into contracts and agreements ((FSA §334.044(7));

- To coordinate the planning of the development of public transportation facilities within the state and the provision of related transportation services as authorized by law. (FSA §334.044(12));

- To designate existing and to plan proposed transportation facilities as part of the State Highway System, and to construct, maintain, and operate such facilities. (FSA §334.044(13));

- To designate limited access facilities on the State Highway System and turnpike projects; to plan, construct, maintain, and operate service roads in connection with such facilities; and to regulate, reconstruct, or realign any existing public road as a service road. (FSA §334.044(17));

- To encourage and promote the development of multimodal transportation alternatives. (FSA §334.044(19));

- To conduct research studies, and to collect data necessary for the improvement of the state transportation system. (FSA §334.044(20));

- To conduct research and demonstration projects relative to innovative transportation technologies. (FSA §334.044(1)); and

- To cooperate with and assist local governments in the development of a statewide transportation system and in the development of the individual components of the system. (FSA §334.044(22)).

Each FDOT District Office of Modal Development is the main point of contact for coordinated efforts the transit agencies in the respective FDOT districts. Various agencies have inter-local agreements and collaborations. For example, Broward County owns the land on which two parking lots in downtown Fort Lauderdale are located and that are maintained and used by the city.

While conducting this study, team members spoke with representatives from a variety of transportation, land use and parking agencies, to better understand interactions between state, regional and local agencies as they related to parking supply and demand management. Given the multitude of entities and interests involved, information sharing and coordinated decision making can be difficult to achieve without intentional efforts to do so. Interviewees in Fort Lauderdale seemed to focus on this

issue in greater detail than those in Miami, where a greater number of coordination efforts were reported. Coordination is challenging given the varying objectives, resources and organizational missions of various transportation-related agencies but these agencies are becoming increasingly aware of the need to more comprehensively and widely coordinate in order to provide better integrated transportation options in the region. Throughout this document, examples of coordination between various agencies are discussed. The FDOT is coordinating with the Florida's Turnpike Enterprise, MDT, BCT, and SFCS on the Urban Partnership Agreement /Congestion Reduction Demonstration (UPA/CRD) project that includes express bus service between Broward County and Miami CBDs. The MPA has coordinated with the DDA and Miami Planning and Zoning to provide nested parking for new residential development that has unbundled parking. The need for this coordination can be seen in the activities of the SFRTA, the SEFRC and the FEC commuter rail project, which could more directly connect the Miami and Fort Lauderdale CBDs, the activities of the planning and zoning departments and the transit agencies to ensure the success of TODs in the CBDs, and between the FDOT, the DDAs and parking authorities on wayfinding, signage and technology to allow the public to more easily find parking in each CBD.

Generally, interviewees called for a more coordinated and systematic approach to transportation planning in the region to allow travelers greater alternative to single-occupant vehicle travel between and around the two CBDs. Thus, these efforts should focus on coordinating transit service with park and ride along major roadway corridors and along the edge of the CBDs. Some interviewees recommended that FDOT foster stronger coordination between BCT and Miami-Dade Transit (MDT). Others called for a merged transit authority for the region, empowering an organization like SFRTA to coordinate with local governments to create transit-supported environments through land use changes and the parking management.

The multitude of players at the state, regional level in decision making can make coordination, particularly between transit and parking, difficult to accomplish. Currently, transit services between Broward and Miami-Dade County is provided by BCT and MDT, TriRail and the FDOT through its 95 Express. A major challenge for all of these transit services is making access to the transit system more convenient; for every transfer a passenger needs to make, the more likely they are to choose to drive alone. Thus, the FDOT, the MPOs and the cities of Miami and Fort Lauderdale need to ensure that the location of park-and-ride facilities are coordinated with transit services including downtown circulators. For example, Broward County, through its transit and traffic engineering departments, is coordinating with the City of Fort Lauderdale, the FDOT, FTA, and other organizations on the WAVE project to a greater degree than it would have for a more traditional (i.e., less integrated) initiative. The WAVE's ultimate success

depends on its integration into the roadway, parking, traffic signal and other systems and the county's efforts reflect this.

At the local level, parking supply to be more clearly coordinated with land use planning and other transportation activities. Miami's downtown serves a variety of users of the transportation system for a variety of needs. It is a destination for tourists to museums, the arena, the port, and other performance spaces; for workers in a variety in city, county, regional and federal governments, professional offices, and retail establishments; and students who attend Miami-Dade College. Increasingly it is a destination for residents who are living in the CBD as new residential developments are built. A major challenge for Downtown Miami is that many of the travelers to the CBD are going there for a single purpose - generally work or entertainment. Individuals coming to the Miami CBD can access this single activity via public transportation or a vehicle that parks in one of the many lots in the CBD. As more residents move into the Miami CBD, the city will need to provide more mobility options for these new residents. This has been recognized by the city as it has developed a new downtown circulator. However, the need for this downtown circulator suggests a need for better coordination of transportation services in the Miami CBD.

Coordination between agencies and between land use and transportation were discussed with stakeholders, who had mixed feelings on the current situation. Some involved in parking processes felt that the existing situation is working smoothly, others objected to the fragmentation between transportation and land use, while still others said there is no alternative to the current situation, due to the size of the City. Likewise, some agreed with the current coordination efforts between those involved, and others said that there is much need for improvement. Stakeholder had many different views on the current parking and transit situation in the CBD, often depending on their position and personal experiences. Local coordination was also identified as a critical issue in addressing issues related to parking supply and demand. Respondents in both jurisdictions suggested that local decision makers and the agencies under their control could be working together more directly to coordinate efforts. One respondent suggested that coordination efforts could be improved by placing those functions, including parking, together in municipal traffic center.

What happens in the Fort Lauderdale and Miami CBDs is influenced by outside agencies and jurisdictions. In addition to those directly involved with the CBD, other agencies and governmental bodies influence the area. For example, there are 30 cities in Broward County, including Fort Lauderdale (Broward County, n.d.). Miami-Dade County has a similar number. Each of these cities has its own government and policies. Broward and Miami-Dade Counties are surrounded by Collier, Hendry, Monroe, and

Palm Beach Counties. Fort Lauderdale is only 25 miles from Miami, which means that what happens in one place affects the other. The Urban Partnership Agreement /Congestion Reduction Demonstration (UPA/CRD) suggested the need to manage movement through the region but also results in the conclusion that the connection between parking and transit need to be considered in other downtowns also the I-95 corridor.

Evaluation

Coordination, as a strategy, can indirectly decrease demand for car trips through strategic land use and transportation coordination. The approach does not necessarily increase the cost of vehicle-based trips, but it can lead to discussions that adhere to this goal. It also can promote strategies to decrease the need to make trips and also creates incentives for travelers to use alternative modes of transportation. It does not necessarily decrease the price of alternative modes of transportation or decrease the use of parking.

Coordination can lead to an increase in alternative modes of transportation supply. Depending on the coordination efforts, the development, expansion, or upgrading of infrastructure can occur, as can coordination with land use, which might contribute to an increase in the accessibility and ease of use for transportation alternatives. Similarly, coordination can promote financial support for the regular operation of alternative modes of transportation, encourage better coordination among different modes of transportation, and subsidize the cost of alternative modes of transportation. If there is successful coordination between transportation and land use efforts, alternative modes of transportation can be promoted, through addressing densities, the urban form, and urban design specifications.

The main social benefit to this strategy is that coordination could enhance livability. It could also reduce unnecessary waste of time and resources by improving the quality of communication between those involved in land use and transportation matters. The main social costs are that this strategy could increase the time it takes for projects to be completed, as well as add another layer of complexity, rather than ease discussions. Generally speaking, the social benefits and costs are difficult to quantify, as they depend on the community, its existing infrastructure, and what would need to be done to improve coordination.

Coordination does not provide a means to raise money. It could influence the allocation of money and how it is earmarked, depending on the type and level of coordination involved. It is difficult to say if the approach will be financially self-

sustainable, as it varies in costs and requirements and is not necessarily related to money in this fashion. The revenues and costs involves are not easily quantified, making changes to them uncertain to predict.

Using coordination can be both politically acceptable and legal. However; there are several possible outcomes and ways to coordinate efforts, which make this strategy more or less likely to be politically accepted or legal. Coordination can be a sensitive topic, as it determines who controls and affects land use and transportation decisions, and how they do so. Stakeholders may embrace this approach and while others may not cooperate or agree with it, or parts of it. While coordination is clear and intelligible, there are many parties who could be potentially involved, which could convolute discussions.

This strategy requires that jurisdictions and functional agencies work together, either with each other or among themselves, and they therefore might not always, and probably will not, have control over the implementation and results of this strategy. Redefining the institutional duties of the various agencies responsible for all modes of transportation may not be politically acceptable and could require major legal changes. Often, it is compatible with current practices and policies, but this is not necessarily so. Effective coordination processes may require the enactment of new laws or modifications to those that currently exist. Coordination legally can stand up in court, at some level, as it is required by the federal government. State legislation should permit this approach, and often encourages it through state actions, such as this study. Coordination, by its very nature, requires flexibility, and varies much by who is involved and in what context.

This strategy is one to keep in mind as planning is provided for and implemented. It is not necessarily something that can just happen, but must be incorporated into processes, procedures, and the general mindset. Certain policies can be implemented to help with along, but overall, this is something to strive to have and improve upon (see Tables 5 and 6).

Recommendations

According to state statutes and other local codes, the coordination of multimodal planning duties is the simultaneous responsibility of the FDOT, MPOs, SFRTA, and corresponding transit agencies. Institutional coordination involves many agencies and the scope, scale and focus of primary responsibility differs between them. One alternative is San Francisco's approach: condense the departments/agencies involved in the processes and by recognizing that jurisdictions overlap. The region must

connect, not just the Cities of Miami and Fort Lauderdale but all of the cities and the counties in the region. Coordination is already being done to some extent, with transit connections existing between Broward and Miami-Dade Counties. Because these counties are inextricably connected, the responsibilities and coordination between the neighboring MPOs and transit agencies require a mechanism to ensure seamless regional transportation system coordination.

The FDOT should partner with regional and local agencies in multimodal planning. FDOT's available resources and their management of the Strategic Intermodal System (SIS) that overlaps and connects the project CBDs and the region make the agency a good ally. The FDOT should outline the future vision and steps towards multimodal coordination by ensuring the facilities they manage connect to or contain adequate capacity for alternative modes of transportation in the form of transfer stations, bikeways, and safe pedestrian paths. This approach would then encourage other government agencies to follow and adopt multimodal planning and require a shift away from the traditional philosophy of adopting a level of service (LOS) based on automobile use and more towards a multimodal LOS. The FDOT has a critical role to take in public education on alternative modes of transportation, providing incentives for TOD and other forms of land use and transportation coordination, and the development of wayfinding systems and the deployment of technology as a part of a coordinated regional system. The FDOT should coordinate with the CBDs along the I-95 corridor to ensure that the Miami and Fort Lauderdale CBDs are not disadvantaged compared to other employment centers as they implement pricing and other parking supply and demand strategies. It will take marginal steps in communities throughout South Florida to reduce the disincentive to transit solutions to congestion reduction. The coordination between New Jersey DOT and NJTRANSIT provides an example of a more expansive role for the FDOT in encouraging transit-oriented development to facilitate greater transit use and reduced traffic congestion.

Other communities, such as Denver, have a combined city/county form of government, which is not a feasible option for Miami or Fort Lauderdale. Similar policies, however, can be adopted. For example, Denver coordinates with other communities and creates coalitions to plan for regional transportation and land use projects. In Maryland, the state transit agency recognizes that there are several destinations that must have transit within them, but also connecting them to areas of the state and beyond.

At the local level, city departments, DDA and the parking authorities in both CBDs need to continue to coordinate parking with land use and transportation decisions to ensure that all commuters, residents and visitors understand their options for getting

to, from, and around downtown using modes other than the automobile. In particular, attention needs to be paid to both aspects of transit-oriented development. Higher density and mixed use without better transit or walkabililty can lead to more congestion in the downtown. Similarly, transit without adequate density will not provide enough riders to ensure frequent and convenient service. Downtown circulators that do not consider opportunities to move parking out of the core of the CBD may miss an opportunity to also remove the traffic associated with parking. Finally, various departments will need to coordinate to make wayfinding and signage systems work to reduce cruising for parking.

Coordination does not directly take people off roads or improve transit services. It does, however, set the framework for these things to happen. Coordinating transportation, land use and parking will lead to more effective use of transit and alternative modes of transportation. The creation of a traffic management center in the downtown, which would bring together police, transit and parking, acting as both an information source and coordinator was a good suggestion. This type of connection is something worth studying, as it may enhance the services that currently exist; however, it is not necessarily the only way to establish and encourage connections. Increased coordination, and decreased levels of complexity, will improve the quality of how parking, land use and transportation are addressed and implemented in the CBDs.
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V. CONCLUSIONS AND FINAL RECOMMENDATIONS

The findings of this study challenge a historical paradigm that promotes making parking both easy to find and free to motorists. The recommendations made as a part of this report promote efficient use of existing parking supplies in an effort to achieve capacity and to, in turn, promote alternative modes of transportation for those travelling to downtown and within it. These recommendations have been discussed with local officials in each city to develop and implementation plan for each of the downtowns. The recommendations in this report are offered with respect to the following issues: pricing; funding; land use planning; coordinated parking policies for alternative modes of accessibility; regulation of parking providers; use of design and technology; public education; and institutional and multimodal coordination.

Twenty-two (22) best practice strategies were defined based on literature review, field research, and best management practices developed through duration of the project. Examples of each strategy were analyzed that focused on peer and model cities developed by the research team. In addition, information was obtained from interviewees and generated from previous technical memoranda. Five categories of analysis criterion were established to evaluate each strategy to determine the extent to which an approach could:

(1) decrease the number of personal vehicle trips that travelers make
(2) increase the supply of alternative modes of transportation
(3) be cost efficient, in terms of social costs and benefits
(4) generate public funds
(5) legally and politically be applied

The strategy of using *pricing to manage* demand is applicable for both Miami and Fort Lauderdale. Neither city is currently implementing this strategy to the level described in the literature; therefore, it is recommended for implementation in both Miami and Fort Lauderdale. The MPA and DTM may be good agencies to implement this strategy.

Benefit districts, where parking revenues are shared with the neighborhood, are recommended for implementation in both Miami and Fort Lauderdale. This strategy is not currently being applied in either CBD. Benefit districts is a good strategy when trying to implement parking prices in a location where parking is currently not priced. Each city's respective parking authority and designated neighborhood associations would be necessary to implement this strategy.

175

Increasing fines as a function of parking price is a good strategy when trying to increase revenues from parking operations while also supporting TDM objectives. Fort Lauderdale is currently executing this strategy according to best practice literature. Current parking fines in Miami are below the threshold described in literature; therefore, it is recommended that Miami apply this strategy to their parking inventory. It may require the coordination from the county level and also respective parking agencies to implement this strategy.

Parking reductions, maximums, exemptions, and unbundling parking are strategies that support efficient land use. Fort Lauderdale allows for shared parking but it is not to the level that is prescribed in literature. It is recommended that parking reductions be implemented if it is determined that parking demand reflect a need for it. It is recommended that Miami apply parking reductions to the CBD pending a parking study to ensure current demand is met. *Parking maximums* attempts to reduce the overall parking supply by limiting the maximum allowed parking for development. Both Miami and Fort Lauderdale could benefit from implementing this strategy in their respective CDBs. *Unbundling parking* is a strategy that allows parking spaces to be leased or rented individually instead of being bundled with lease of building space. The strategy supports TDM objectives and is relatively easy to implement. Both Miami and Fort Lauderdale could benefit from the implementation of unbundled parking. *Parking exemptions* is another strategy that supports efficient land use and a reduced parking supply. Fort Lauderdale is currently employing a parking exemption program in the CBD. The planning and zoning departments of each city would be best suited to implement this strategy

Promotion of TOD is a strategy that encourages transit use, efficient land use, and mixed land use. It is strongly recommended that TODs are encouraged in Fort Lauderdale. It is also recommended that future amendments to Miami 21 specifically encourage creation of TODs even though current language generally encourages efficient land development principles. Coordination with FDOT, respective city planning departments and transit agencies would be beneficial for the promotion of TODs.

Incentives for *smart growth* support TDM initiatives to influence mode shift. Though mixed-use developments are allowed in Fort Lauderdale and Miami, it is recommended that smart growth incentives be furthered in both CBDs. The planning and zoning departments of both Miami and Fort Lauderdale are best suited to create incentives for smart growth.

Negotiating parking requirements is a strategy that gives municipalities flexibility in dictating allowing parking for developments. The Fort Lauderdale CBD does not

need a negotiation process because the majority of the downtown qualifies for parking exemptions. Miami 21 currently allows for developer flexibility but specific enumeration of parking requirement negotiation should be amended into the plan. The Miami planning and zoning department are best suited to negotiate parking requirements.

Encouraging mass transit services provides greater options for travelers; the goal is to create a mode shift from travel via automobile to transit service. It is recommended that mass transit services be applied in Fort Lauderdale. Coordinating agencies may include Broward County Transit, DTM, Downtown Fort Lauderdale Transportation Management Association, and Fort Lauderdale DDA. Agencies should also work together in Miami to encourage the mass transit link to parking. Agencies may include Miami-Dade Transit, MPA, and Miami's DDA.

Park-and-ride provisions can be applied in tandem with a number of other strategies (i.e., mass transit services) to better its efficacy. Park-and-ride services benefit TSM initiatives as it allows for a more efficient use of the parking supply. This strategy is recommended for implementation in Miami. Agencies like MDT and SFRTA would be best suited to coordinate and implement parking and ride facilities in Miami. Park-and-ride strategy is also recommended for application in Fort Lauderdale. Implementing agencies may include BCT and SFRTA.

Car-sharing strategy is an innovative strategy that allows travelers to substitute the use of car-sharing services for vehicle ownership. However, the market is only beginning to support this strategy; Miami is beginning a partnership with Car2go this summer. The Fort Lauderdale CBD should continue to assess market for car-sharing so that they can take advantage when the conditions are right to introduce car-sharing.

Bicycle facility planning is a strategy that supports TDM objectives because it provides alternative modes of transportation for travelers. The efficacy of this strategy may be increased if it were implemented in conjunction with parking reductions. This would create a greater incentive to travel via bicycle rather than automobile. It is recommended that Fort Lauderdale develop a bicycle master plan and incorporate minimum bicycle parking requirements into the ULDR. Miami has shown initiative in focusing on bicycle parking and it is recommended that they continue to implement their efforts. The implementing agencies would most likely be each city's respective planning and zoning departments.

Providing *commuter incentives* for alternative modes of transportation is a strategy that directly attempts to encourage travelers to reconsider their mode choice. SFCS (South Florida Commuter Services) currently has initiatives to encourage

alternative modes of transportation as do some corporations. It is recommended that SFCS continue its efforts and better coordinate with corporations to make more attractive incentives for mode shift.

The *taxing commercial parking* strategy focuses on levying money on parking transactions. The goal is to pass this cost onto the user so that it increases the price of automobile use, supporting TDM objectives. It is recommended that both Miami and Fort Lauderdale consider use of taxation strategies to their respective downtown areas. Miami currently charges a surcharge for commercial parking but the rate they charge is low compared to other cities. By state statute, Fort Lauderdale is currently not allowed to charge these taxes. The implementing agencies may be city legislative bodies.

Rate regulation and collection of taxes and fees is different from the aforementioned taxes in that it is a *per-space levy*. These taxes focus on parking providers with the goal of managing parking supply. It is recommended that both Fort Lauderdale and Miami apply this strategy in their respective CBDs. The legislative body in both cities may be the implementing agency for this strategy.

The *signage and wayfinding* strategies describe the best practice application of sign regulations for parking providers as well as wayfinding systems. This strategy supports TSM objectives as they both increase the efficiency of the transportation system. The Miami DDA has plans in plans in place to implement a wayfinding system in the CBD in the near future. Miami currently has legislation in place to manage signage but officials have made mention that greater regulation be in place. Therefore, it is recommended that better signage regulations be applied and City of Miami. Fort Lauderdale does not have plans to implement a wayfinding system in the CBD nor does it have specific regulations for parking signage; therefore, this strategy, in its entirety, is recommended for implementation in Fort Lauderdale. DTM and Fort Lauderdale legislative bodies may be implementing agencies of this strategy.

Electronic systems are designed to increase the efficiency of revenue collection for parking operations. Both Miami and Fort Lauderdale have current generation electronics in their parking operations; therefore, each CBD is encouraged to continue to innovate in their use of electronic systems. No specific recommendations are made for either CBD.

The use of sensors *and real-time data collection* in a comprehensive system is an innovative strategy. The goal is make the transportation system more efficient by providing the user with real-time information. SF*park* has pioneered this technology on a large scale with the help of Federal funds. A comprehensive system can be cost

prohibitive so this is not recommended for Fort Lauderdale and Miami at this time. However, both cities should continue to find opportunities to provide real-time parking information and in the near future, both CBDs should put together a plan for a long-range deployment of real-time data collection.

Improving *public education* is a strategy that maintains public awareness of municipal intentions to manage the transportation system. This strategy could be used in conjunction with other strategies to promote municipal goals. A good example may be use public education to compliment the encouragement of the use of alternative modes of transportation. Both Miami and Fort Lauderdale could benefit from the implementation of this strategy. The FDOT could be an implementing agency of this strategy.

Coordination between agencies is essential for effective multimodal coordination. Downtown agencies, city departments, county agencies, regional agencies and the FDOT all have a role to take in the coordination between land use and parking, between transit and parking and the coordination among transportation, land use and parking. It is recommended that all agencies that influences the Miami and/or Fort Lauderdale CBDs work together to manage transportation and land use issues while promoting multimodal options. The FDOT can play an important role in facilitation coordination between various local and regional organizations in public education about transportation alternatives, wayfinding and signage, the deployment of technology, and the encouragement of transit and pedestrian-oriented developments.

Implementing these strategies will pose a major challenge and will require the commitment of organizations at the local, regional and state level to begin to turn around the automobile dominated environment that defines South Florida. Many steps have been taken to make the CBDs in Fort Lauderdale and Miami into multi-functional downtowns. Residential development has been built, transit options, including downtown circulators, are being developed and innovative technologies have been deployed to simplify parking. These important first steps and the cooperation of diverse organizations could be the building block for the creation of a virtuous cycle that could increase the efficiency and effectiveness of the parking supply while reversing the cycle of automobile dependence in these CBDs.

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APPENDIX A: TECHNICAL ADVISORY COMMITTEE MEMBERS

Name	Title	Organization
Ackert, Melissa	TSM & Operations Manager	FDOT D4 Traffic Operations
Adams, Alex	Pedestrian Coordinator	City of Miami Planning Dept
Alarcon, Diana	Director	Fort Lauderdale (DTM)
Argudin, Alejandra	Chief Development Officer	Miami Parking Authority
Arscott-Douglas, Chelsa	Development Admin, Media Relations	Miami CRA, Policy & Program
Ayres, Daniel	Project Manager	Broward Co. Public Works/Construction Mgmt Division
Bell, Sandra	Business Systems Coordinator	FDOT Research Center
Betancourt, Javier	Manager of Urban Planning & Transportation	Miami Downtown Development Authority (DDA)
Birriel, Elizabeth	Deputy State Traffic Engineer –ITS	FDOT/ITS
Borges, Lisa		
Bouclé, Aileen	AICP, District Planning and Environmental Management Administrator	FDOT D6
Bravo, Alice	P.E., Director of Transportation Systems Development	FDOT D6
Bredemeyer, Frederick	Chief Operations Officer	Miami Parking Authority
Brewton, Greg	Director	Fort Lauderdale Planning and Zoning
Brimlow, Rodney	Sargeant	Broward Sheriff Office. Worked with FDOT
Brissett, Lorin R.C.	Engineer and Project Manager for HNTB	HNTB
Brunner, Scott S.	Chief Operating Officer	Calvin, Giordano & Associates, Inc.
Caffrey, Krista	FDOOT Project Manager	FDOT D4
Campbell, Scott	Assistant Director	Broward County Facilities Management
Carson, Ed	Public Transportation Office	FDOT D6
Chen, Dong	Project Manager	FDOT D4
Chiarelli, Robyn	Outreach Coordinator	FDOT D4, South Florida Commuter Services, Office of Modal Development
Cross, Renee	Planner II	Fort Lauderdale Planning and Zoning
Dickson, Tom	Severe Incident Response Manager	FDOT D4
Dockstader, Darryll	Manager	FDOT Research Center
Dykstra, Lisa	Project Manager	FDOT Planning
Evangelos Kaisar	Assistant Professor	FAU Civil, Environmental and Geomatics Engineering

Faquir, Tahira	RFP Development	Vanus, Inc.
Filer, Carl	Public Transportation Manager	FDOT D6, Public Transportation Office
Flavien, Paul	Transportation Modeler	Broward MPO
Forbes, Clinton	Assistant Manager	Miami Dade Transit:
Galvez, Roberto	Service and Capital Planner	Broward County Transit
Garcia, John	Principal Planner	Miami Dade Transit
Garcia-Pons, Cesar	Sr. Manager	Miami DDA, Planning Design and Transportation Services
Gonzalez, Jose	Assist. City Manager and Interim Public Works director	City of Miami
Greely, Mark	Research Performance Coordinator	FDOT Research Center
Gretsas, George	City Manager	City of Ft. Lauderdale
Guerra, Jesus	Transportation System Manager	Miami Dade MPO
Hadi,Mohammed A.	Associate Professor	FIU
Hadi, Mohammed A.	Associate Professor	FIU
Henk, Koornstra	Assistant Director	Traffic Engineering Broward County
Hernandez, Israel	Transit Service Planner	BCT
Hilaire, Marjorie	Engineer	FDOT D4
Holloway, Tykus R.	Engineer Office of Modal Development	FDOT D4
Hymowitz, Larry	District 4 Ped-Bike Coordinator	FDOT D4
Ingle, Sarah W.	Urban Planning and Transportation Manager	Miami Downtown Development Authority (DDA)
Jefferies, Ken	D6 SIS Coordinator	FDOT D6
Jessup, Wayne	Deputy Director	Ft. Lauderdale Planning and Zoning Dept
Josselyn, Jessica	Senior Planner	Kittelson & Associates, Inc. Fort Lauderdale
Khan, Saud	Project Manager	FDOT
Koos, Mary Anne	Special Projects Coordinator	FDOT-Roadway Design Office
Kulikowski, Lina Chen	Principal Planner	Broward MPO
Kumar, Girish	AVP	HNTB
Labinsky, Richard	City Engineering	City of Hallendale DPW/Utilities & Engineering
Leeks, Gladys	Staff	Broward MPO
Lin, Pei-Sung	Program Director	CUTR, Univ. of South Florida
Mccoy, Barney	Transit Manager, Service and Capital Planning	Broward County Transit
McGee, Michael	TIM Coordinator	FDOT D4
Medina, Lilia	City Office Assistant Manager	City of Miami , Assistant Transportation Coordinator
Meitin, Omar	P.E., District Traffic Operations Engineer	FDOT D6 Traffic Operations

Miura, Derek	Transportation Planner	FDOT D4
Noriega, Art	Executive Director	Miami Parking Authority (Dept. of Off-street Parking)
Overton, Jonathan	P.E., Assistant Traffic Operations Engineer	FDOT D4 Traffic Operations
Parker, Ella	Principal Planner	Ft. Lauderdale Planning and Zoning Dept
Partington, Peter	City Engineer	City of Fort Lauderdale
Plass, Mark	District Traffic Operations Engineer	FDOT D4
Polo, Ernesto	Transportation Planner	Miami Dade Transit
Ramos, John	Service and Capital Planning	Broward County Transit Division
Renna, Nick	Safety and Traffic Operations	FHWA
Rivera, Debora	P.E., District Director of Transportation Operations	FDOT D6
Roberson, Jonathan	Senior Planner	Broward County Transportation Department
Robertson, Alyce	Executive Director	Miami Downtown Development Authority (DDA)
Ronskavitz, Michael	Assistant Director	Broward MPO
Santana, Rory	ITS	FDOT D6
Scarlatos, Panagiotis	Dept Chair and Professor	FAU Civil, Environmental and Geomatics Engineering
Schmand, Timothy	Executive Director	Bayfront Park Management Trust
Schwartz, Kara	Traffic Operations Coordinator	FDOT Planning
Scott, Stephen	Director	For Lauderdale Department of Economic Development
Sebo, Andrew	Traffic Operations Engineer; P.E., PTOE	Broward County Traffic Engineering Division
Sierra, Ramon	Assistant Traffic Operations Engineer	FDOT D6 Traffic Operations
Smith, Daniel A.	ITS operations manager	FDOT D4
Somoza, Napoleon	Principal Planner	Miami-Dade County Dept. of Planning and Zoning
Stuart, Gregory	Executive Director	Broward MPO
Swirsky, Lorin	IT Manager	Broward County Transportation Department
Thallapragada, Girish	Project Engineer	HNTB
Van Zhandt, Elizabeth	Planning and Design Manager	Fort Lauderdale DDA
VanAssche, Karen	Administrative Aide to the Director	Ft. Lauderdale (DTM)
Vandervalk, Anita	President of ITS. Manager FDOT	Cambridge Systematics, Inc. and FDOT
Villacorta, Jim	Executive Director	Miami CRA
Voorhies, Kenny	Senior Associate,	Cambridge Systematics
Weidner, Jeff	SIS Coordinator and Mobility Manager	FDOT D4
Weller, Pamela	Real Estate Developer	Bayside Shopping Center: Bayfront Park Management Trust
Wren, Chris	Executive Director	Downtown Development Authority of Fort Lauderdale

Zeiler, Patricia	Managing Director	Downtown Fort Lauderdale TMA
Zelaya, Enrique	Planning Section Manager	Broward MPO

APPENDIX B: LIST OF PERSONS INTERVIEWED

Abass, Niyi	Washington Metropolitan Area Transit Agency	Parking Manager
Ackert, Melissa	FDOT District 4	TSM & Operations Manager
Adler, Brian	Bilzin Sumberg Attorneys at Law	Partner
Alarcon, Diana	DTM	Director
Amaro, Vasti	Tech Trans	Senior Vice President
Argudin, Alejandra	Miami Parking Authority	Chief Development Officer
Arscott, Chelsa	CRA	Program Administrator
Batista, Maria	Miami-Dade Transit	
Bryant, Bill	Seattle DOT	Transportation Program Manager
Burgess, Terry	City of Fort Lauderdale, Planning & Zoning Department	Chief Zoning Officer
Cahill, Maria	FDOT	Senior Policy Analyst
Calloway, Sidney	State of Florida	State Transportation Commissioner
Campbell, Scott	Broward County Facilities Management	Assistant Director
Cavendish, Kim	Museum of Discovery and Science	President/CEO
Cornely, Tina	Miami Art Museum	Assistant Director for Operations and Special Projects
Cromer, James	Broward MPO	Livability Planner
Cross, Renee	Fort Lauderdale Planning and Zoning	Planner III
Cross, William	SFRTA	Manager of Planning and Engineering
Dotson, Albert	Bilzin Sumberg Attorneys at Law	Partner
Fajardo, Anthony	Fort Lauderdale Planning and Zoning	Planner III
Flavien, Paul	Broward MPO	Transportation Modeler
Foutz, Larry	Miami-Dade MPO	Transportation Systems Manager
Garcia, Francisco	City of Miami Planning Department	Director
Garcia, John	Miami-Dade Transit	Principal Planner

Garling, Tim	Broward County Transit	Director
Girisgen, Dennis	Fort Lauderdale Building Services	Engineer
Glenn, Sabrina	South Florida Commuter Services	Transportation Management Initiative Administrator
Goldstein, Jeremy	Gannett Fleming, Inc.	Project Manager
Gonzalez, Jose	City of Miami	Assist. City Manager and Interim Public Works director
Gonzalez, Luciana	City of Miami Planning Department	Assistant Director
Goyanes, Jose	Flagler Street Retailer / Miami DDA Board	Owner
Guarch, Gerry	Miami-Dade College Wolfson Campus	Assistant Dean of Administration
Guerra, Jesus	Miami-Dade MPO	Transportation Systems Manager
Hadi, Mohammed	FIU Lehman Center	Associate Professor
Hemingson, Todd	Capital Metropolitan Transportation Authority	Vice President of Strategic Planning and Development
Henderson, David	Miami-Dade MPO	Bicycle and Pedestrian Specialist
Hernandez, Albert	Miami-Dade Transit	Assistant Director Engineering, Planning and Development
Hilaire, Marjorie	FDOT District 4	Engineer
Hollo, Jerome	Florida East Coast Realty / Miami DDA Board	Vice President
Holness, Dale	Broward County	Commissioner, District 9
Hull, David	King County, Metro Transit Division	Service Planning Supervisor
Ingle, Sarah	Miami DDA	Urban Planning and Transportation Manager
Kumar, Girish	HNTB	Assistant Vice President
Lake, Margaret	Gusman Center for the Performing Arts	Director
Linares, Danet	Blanca Real Estate / Miami DDA Board	Executive Vice President
McDowell, Carter	Bilzin Sumberg Attorneys at Law	Partner
Medina, Lilia	City of Miami, Office of the City Manager/Office of Transportation	Assistant Transportation Coordinator

Meitin, Omar	FDOT District 6	Operations Engineer
Nelson, Howard	Bilzin Sumberg Attorneys at Law	Partner
Noriega, Art	Miami Parking Authority	Executive Director
Ojeda, Alan	Rilea Group	President/CEO
Osterholt, Jack	Miami-Dade County	Deputy County Mayor
Page, Ralph	Las Olas Company	Director of Security
Parker, Ella	Fort Lauderdale Planning and Zoning	Principal Planner
Pereira, Felix	Port of Miami	Planning Director
Plasencia, William	City Commissioner Sarnoff's Office	Community Liason for Brickell, Downtown, and Midtown
Plass, Mark	FDOT District 4	Traffic Operations Engineer
Primus, Jay	SFMTA	Manager of SF*park* Program
Quincy, Joseph	South Florida Regional Transportation Authority	Transportation Planning Manager
Ramos, John	Broward County Transit	Service and Capital Planning
Ressler, Gary	Dupot Building/ABC Management – Downtown Miami Partnership	Chief Operating Officer / Representative
Rivera, Debora	FDOT District 6	Director of Transportation Operations
Roberts, Bruce	Broward County	Commissioner
Robertson, Alyce	Miami DDA	Executive Director
Rodrigues, Thomas	City of Miami – Office of the City Manager/Transportation	Transportation Planner
Rodriguez, Javier	MDX	Executive Director
Samoza, Napoleon	Miami-Dade Planning and Zoning	Principal Planner
Schmand, Tim	Bayfront Park Management Trust	Executive Director
Schwartz, Allison	Seattle DOT	Community Parking Program Manager
Steslow, Frank	Miami Science Museum	Chief Operating Officer
Stone, Kim	American Airlines Arena (AAA)	Executive VP and General Manager
Stuart, Gregory	Broward MPO	Executive Director

Thomas, Gillian	Miami Science Museum	President and CEO
Tober, Doug	Broward Center for Performing Arts	VP and General Manager
Weidner, Jeff	FDOT District 4	SIS Coordinator and Mobility Manager
Woerner, Mark	Miami-Dade County	Chief, Metropolitan Planning Section
Wren, Chris	Fort Lauderdale DDA	Executive Director
Zahn, Eric	South Florida Regional Transportation Authority	Transportation Planner
Zeiler, Patricia	Downtown Fort Lauderdale Transportation Management Association	Managing Director

APPENDIX C: PEER AND MODEL CITIES

The peer cities were identified using the following methods: (1) public officials in Miami and Fort Lauderdale were consulted and asked who they identify as peer cities; and (2) the research team selected additional cities based on secondary sources, Census data and literature on the topic. Using the cities recommended by city officials as a start, the research team considered specific variables at three different scales: (1) at the CBD level – population density, population, housing density, and employment density; (2) at the Urbanized Area (UA) level – total employment and employment density; and (3) at the Metropolitan Statistical Area (MSA) level – total population, total housing units, and total employment. If the cities were comparable to the project CBDs with respect to these variables, particularly at the CBD scale, these cities were considered peer cities. This appendix describes how the peer and model cities were selected for this study.

The cities recognized by public officials as peer cities in Fort Lauderdale include:

- Orlando
- Austin
- Kansas City
- Las Vegas
- Seattle
- Portland

The cities recognized by public officials in Miami include:

- Atlanta
- Washington, D.C.
- Houston
- Dallas

The cities further researched by the research team based on the literature review are:

- San Francisco
- Detroit
- Houston
- Phoenix
- Philadelphia
- Boston
- St. Paul

- Pittsburgh
- San Diego
- Denver
- Los Angeles

These cities were selected based upon their similarity with Miami and Fort Lauderdale. Based on the factors such as population, population density, employment density and household density, the cities are divided into two categories: peer cities and model cities. Peer cities are defined as cities that are similar to Miami and Ft. Lauderdale based upon housing, population and employment characteristics, while "model" cities are defined as cities that use some of the best practices in parking supply and demand management. The following section makes recommendations for comparisons of peer cities based upon four levels of analysis (from smallest to largest scale): CBD level, city level, urbanized area level and MSA level.

CBD Level

Population, housing unit and employment data were collected from the 2000 Census at a tract level for the cities defined in the previous step.   The census tracts were carefully selected based upon their contiguity with the CBD boundaries; in some cases, the census tracts partially exceed these boundaries.   CBD boundaries for the peer cities were determined with data from government agencies, neighborhood associations, city halls, www.city-data.com, and www.mappery.com.   CBDs were individually compared to the CBDs of Miami and Fort Lauderdale.

Miami's CBD was comparable to several peer cities in population, housing and employment because their range falls within the qualifying ranges that are show in Table 21.   Phoenix, Detroit, Indianapolis, and Milwaukee are Miami's peers.   Fort Lauderdale has similar population density and housing unit density to Phoenix, Atlanta, and Detroit.   Miami and Fort Lauderdale in general had a lower population and household value compared to the other cities. Table 1 shows which cities compared to the Miami CBD densities in population, housing units, and employees.   The cities with a score of three are considered potential peer cities.

TABLE 20 - CBD COMPARISON OF MIAMI CBD CORE

Geography	CBD Population	CBD Households	CBD Employment	Score
Miami Core CBD	9,181	3,295	67,652	
Qualifying Range	<5,000-13,000>	<1,000-5,000>	<50,000-80,000>	
Phoenix	x	x	X	3
Detroit	X	X	X	3
Indianapolis	X	X	X	3

Milwaukee	X	X	X	3
Orlando	X			1
Pittsburgh	X	X		2
Portland	X		X	2
San Antonio			X	1
San Diego			X	1

The DDA boundary was chosen as the project boundary for the Miami CBD but this boundary excludes significant portions of downtown Miami. Because of this, an expanded CBD boundary was also analyzed to include areas of downtown Miami such as Brickell. Different qualifying ranges for CBD population, households and employment were used. Based on this expanded boundary, Atlanta, Baltimore, Denver and Minneapolis can also be considered peer cities to the Miami at a CBD level. Table 22 shows the result of this analysis. Again, the cities with a score of three are considered potential peer cities.

TABLE 21 - CBD COMPARISON OF EXPANDED MIAMI CBD

Geography	CBD Population	CBD Households	CBD Employment	Score
Miami Expanded CBD	21,852	10,428	98,000	
Qualifying Range	<10,000-30,000>	<2,000-18,000>	<80,000-160,000>	
Atlanta	X	X	X	3
Baltimore	X	X	X	3
Boston				0
Dallas			X	1
Denver	X	X	X	3
Houston	X		X	2
Minneapolis	X	X	X	3
Philadelphia				0
San Francisco				0
Seattle	X	X	X	3
Washington, D.C.	X	X		2

Due to Fort Lauderdale's smaller CBD, there were fewer cities that qualified as peer cities. Fort Lauderdale had similar employment levels as Boulder, Kansas City, Orlando and St-Pail. The population and number of households in the Fort Lauderdale CBD were much smaller than most of the cities found in Table 23. Boulder is the only city that was found to have comparable population, households and employment.

TABLE 22 - CBD COMPARISON OF FORT LAUDERDALE CBD

Geography	CBD Population	CBD Households	CBD Employment	Total
Fort Lauderdale	3,817	874	23,256	
Qualifying Range	<2,500-5,500>	<0-2,000>	<0-50,000>	
Boulder	X	X	X	3
Dallas		X		1
Kansas City		X	X	2
Phoenix				0
Orlando			X	1
St Paul			X	1

City Level

This comparison is based on the political boundaries on the peer and model cities at a city level. Because this analysis is based on political boundaries and not functional boundaries, this analysis is not considered to be the most reliable for comparisons. The population density, housing density and employment density of several cities were compared to Miami and Fort Lauderdale. Washington, D.C. had similar employment, housing and population densities to Miami. Baltimore, Minneapolis - St. Paul, and Philadelphia had similar population and housing densities to Miami. Table 24 shows the results of the Miami comparisons at a city level. Fort Lauderdale matched most closely to Pittsburg at a city scale having similar population, housing and employment densities.

TABLE 23 - CITY LEVEL COMPARISON OF MIAMI PEER CITIES

Geography	Population Density (per sq. mile of land area)	Housing Density (per sq. mile of land area)	Employment Density (per sq. mile of land area)	Total
Miami	10,356	4,240	6,496	
Qualifying Range	<7,000-13,000>	<3,000-5,000>	<4,500-8,500>	
Baltimore	X	X		2
Boston	X		X	2
Chicago	X			1
Los Angeles	X			1
Minneapolis-St. Paul	X	X		2
Philadelphia	X	X		2
San Francisco-San Jose			X	1
Washington, D.C.	X	X	X	3

Urbanized Area Level

The next level of analysis compares employment density at an urbanized area scale. In terms of urbanized area peer review cities were compared to the urbanized area of Miami only, since data for Miami and Fort Lauderdale are aggregated. Table 26 shows of the employment density of the Miami urbanized area and other urbanized areas. Miami's employment density in its urbanized area is most like Phoenix, Portland, Washington, D.C., and Las Vegas.

It is important to note that a significant portion of the office inventory in Southeast Florida is in or nearby the main downtown areas of the region – Miami, Fort Lauderdale, Boca Raton, and West Palm Beach (Table 24). Older comparison areas, including Seattle and Washington, D.C., have higher concentrations of office space within their downtowns, but Southeast Florida's office space is less dispersed than in several other Sunbelt cities, including San Diego, Los Angeles, Houston, Phoenix, and Orlando. Higher density CBDs, such as those in Washington and Seattle (as well as in several other large North American cities) combine large inventories of office space with geographically concentrated downtowns, factors that support relatively high levels of transit ridership among daily commuters (Economic Development Research Institute, p. 59, n.d.).

TABLE 24 - CITY LEVEL COMPARISON OF FORT LAUDERDALE PEER CITIES

Geography	Population Density (per sq. mile of land area)	Housing Density (per sq. mile of land area)	Employment Density (per sq. mile of land area)	Total
Fort Lauderdale	4,916	2,608	3,951	
Qualifying Range	<3,500-6,500>	<2,000-3,200>	<3,000-4,000>	
Atlanta				1
Dallas	X			1
Detroit		X		2
Houston				0
Milwaukee	X	X		2
Pittsburgh	X	X	X	3
Portland	X			1
San Diego	X			1
Seattle		X	X	2

Metropolitan Statistical Area Level

As it was the case with urbanized areas (UA), peer cities at the level of MSA were compared only with the Miami Metropolitan Area since it includes the counties of Miami-Dade (includes the city of Miami), Broward (includes the city of Fort Lauderdale), and Palm Beach. Based on the 2006-2008 American Community Survey, the Miami-Fort Lauderdale-Pompano Beach Metropolitan Area had a total population of 5,403,075, similar to the Houston-Sugar Land-Baytown and Washington-Arlington-Alexandria. The Miami MSA was similar in total housing units to Houston-Sugar Land-Baytown and Atlanta-Sandy Springs-Marietta.   Total employment for the Miami MSA is 2,191,516 according to the 2008 Census projections. This is most similar to San Francisco, Washington and Atlanta MSAs. Densities of the metropolitan areas were not calculated because the area of the boundaries includes lakes, conservation areas, and other types of areas that are not buildable.

TABLE 25 - EMPLOYMENT DENSITY OF SELECT URBANIZED AREAS

Urbanized Area	Employment	Square Miles	Employment Density
Atlanta, GA Urbanized Area	1,766,896	1,962.60	900.3
Boston, MA--NH--RI Urbanized Area	2,009,750	1,736.20	1,157.60
Philadelphia, PA--NJ--DE--MD Urbanized Area	2,339,496	1,799.50	1,300.10
Houston, TX Urbanized Area	1,715,413	1,295.30	1,324.40
Detroit, MI Urbanized Area	1,743,255	1,261.50	1,381.90
Dallas--Fort Worth--Arlington, TX Urbanized Area	2,007,248	1,407.00	1,426.60
Phoenix--Mesa, AZ Urbanized Area	1,333,466	799	1,668.90
Portland, OR--WA Urbanized Area	794,520	473.9	1,676.40
Washington, D.C.--VA--MD Urbanized Area	2,047,764	1,156.80	1,770.20
Miami, FL Urbanized Area	2,084,645	1,116.10	1,867.80
Las Vegas, NV Urbanized Area	605,394	285.9	2,117.40
San Francisco--Oakland, CA Urbanized Area	1,468,086	526.7	2,787.60

Source: demographia.com/db-usaua-employ.htm, based off the 2000 Census

TABLE 26 - TOTAL POPULATION AND HOUSING UNITS OF PEER METRO AREAS

Metropolitan Area	Total Population	Housing Units	Total Employment (MSA)
Dallas-Fort Worth-Arlington, TX Metro Area	6,150,828	94,588	2,917,797
Houston-Sugar Land-Baytown, TX Metro Area	5,603,882	79,612	2,535,968

Geography						
Miami-Fort Lauderdale-Pompano Beach, FL Metro Area	5,403,075	82,182	2,191,516			
Washington-Arlington-Alexandria, D.C.-VA-MD-WV Metro Area	5,306,742	85,425	2,090,725			
Atlanta-Sandy Springs-Marietta, GA Metro Area	5,251,899	76,039	2,337,133			
Detroit-Warren-Livonia, MI Metro Area	4,456,416	86,100	1,820,144			
San Francisco-Oakland-Fremont, CA Metro Area	4,222,756	65,677	2,008,437			
Phoenix-Mesa-Scottsdale, AZ Metro Area	4,160,999	63,135	1,820,983			

Population and Housing Units Source: U.S. Census Bureau, 2006-2008 American Community Survey. Employment Source: US Census Bureau, LED OnTheMap Origin-2008

The Miami-Fort Lauderdale CMSA was compared to several consolidated metropolitan statistical areas (CMSA) based on total population, total housing units and total employment. The Atlanta CMSA is the most similar to the Miami-Fort Lauderdale CMSA. Other CMSAs that are comparable are Dallas-Fort Worth, Detroit-Ann Arbor-Flint, Houston-Galveston-Brazoria, and Phoenix-Mesa. The totals of population, housing and employment produced more meaningful results than the densities of those variables.

TABLE 27 - COMPARISON OF MIAMI-FORT LAUDERDALE TO PEER MSA

Geography	Total population: Total	Housing units: Total	Employment: Total	Population Density (per sq. mile of land area)	Housing Density (per sq. mile of land area)	Employment Density (per sq. mile of land area)
Miami--Fort Lauderdale, FL CMSA	3,876,380	1,593,321	2,110,488	1,230	506	670
Range	<3,000,000-5,000,000>	<1,000,000-2,000,000>	<1,500,000-2,500,000>	<1,000-1,500>	<400-600>	<500-800>
Atlanta, GA MSA	X	X	X			
Boston--Worcester--Lawrence, MA--NH--ME--CT CMSA			X	X	X	
Cleveland--Akron, OH CMSA		X				
Dallas--Fort Worth, TX CMSA		X	X			
Detroit--Ann Arbor--Flint, MI CMSA		X	X			

Houston--Galveston--Brazoria, TX CMSA	X		X			
Minneapolis--St. Paul, MN--WI MSA		X				
Phoenix--Mesa, AZ MSA	X	X				
San Diego, CA MSA						
Seattle--Tacoma--Bremerton, WA CMSA	X					

CBD Employment Magnetism

Another way to compare the CBDs in cities is to see what percent of the jobs in the MSAs are in the CBDs. This is an indication of the economic strength that the CBDs have with respect to their regions. This analysis shows that both Miami and Fort Lauderdale have relatively smaller downtowns compared to their metropolitan region because of the small percentage of jobs in each CBDs. This suggests that employment is more dispersed in the Miami MSA. Miami is similar to St. Paul, Dallas, Kansas City, Detroit, San Diego and Atlanta with respect to the percentage of MSA that are in the CBD. Fort Lauderdale is more similar to Philadelphia. Based on this table, Indianapolis, Chicago, Milwaukee, Phoenix, San Antonio and Seattle have strong CBDs that are able to attract employment. Table 29 compares the percent of jobs in the MSAs that are in the CBDs.

Summary

Based on all of the variables at different scales, this report uses Boulder as a peer city to Fort Lauderdale because of its similar population, household and employment characteristics at a CBD level. Miami's peer cities are Phoenix, Washington, D.C., Atlanta and Detroit due to their similar characteristics as CBD level and metropolitan level. Table 30 provides information on transportation system characteristics that can place the Miami and Fort Lauderdale into perspective compared to other cities. Tables 31 and 32 summarize how the project CBDs compare to other cities.

TABLE 28 - PERCENT OF MSA JOBS THAT LIE IN THE CBDS

City	CBD Jobs Count	MSA Jobs Count	Percent of MSA
Fort Lauderdale	28396	2117696	1.34%
Philadelphia	55086	2599100	2.12%
St Paul	48992	1676538	2.92%
Miami Core CBD	70750	2117696	3.34%
Dallas	106753	2855473	3.74%
Kansas City, MO	37422	941468	3.97%
Miami Expanded CBD	90848	2117696	4.29%
Detroit	75714	1677457	4.51%
San Diego	55183	1192937	4.63%
Orlando	55086	978669	5.63%
San Francisco	108668	1929944	5.63%
Atlanta	128612	2208939	5.82%
Houston	147467	2491142	5.92%
Portland	81858	966199	8.47%
Minneapolis	151329	1676538	9.03%
Baltimore	109097	1189641	9.17%
Pittsburgh, PA	106770	1076562	9.92%
Boulder, CO	14924	149395	9.99%
Milwaukee	83102	803965	10.34%
Chicago	437681	4143675	10.56%
Seattle	170748	1610196	10.60%
San Antonio	86815	803257	10.81%
Indianapolis	121922	847978	14.38%
Phoenix	16803	76558	21.95%
Washington, D.C.	2044276	Information Unavailable	
Boston	Information Unavailable		

210

TABLE 29 - COMPARISON OF TRANSPORTATION SYSTEM CHARACTERISTICS AND USAGE FOR COMPARABLE CITIES

Geography	Freeway		Arterial Street		Travel Time Index[2]	Public Transportation	
	Daily Vehicle-Miles of Travel (000)	Lane-miles	Daily Vehicle-Miles of Travel (000)	Lane-miles	Value	Annual Passenger-miles (million)	Annual Unlinked Passenger Trips (millions)[3]
Indianapolis, IN MSA	13,000	900	12,165	1,900	1.21	47	9
Orlando, FL MSA	13,540	870	17,000	2,240	1.30	159	26
Milwaukee--Racine, WI CMSA	11,055	750	14,545	3,980	1.13	154	48
Kansas City, MO--KS MSA	21,015	1,925	13,315	3,235	1.07	63	16
Sacramento--Yolo, CA CMSA	15,955	825	14,135	2,390	1.32	167	36
Cincinnati--Hamilton, OH--KY--IN CMSA	18,990	1,235	12,175	2,800	1.18	148	30
Portland--Salem, OR--WA CMSA	13,625	785	13,810	2,570	1.29	449	107
Pittsburgh, PA MSA	12,405	1,275	17,360	3,685	1.09	356	72
Tampa--St. Petersburg--Clearwater, FL MSA	14,100	885	28,915	3,845	1.31	131	26
Denver--Boulder--Greeley, CO CMSA	20,395	1,280	22,925	3,715	1.31	538	94
St. Louis, MO--IL MSA	29,610	2,350	18,145	4,200	1.13	297	57
San Diego, CA MSA	38,400	1,990	22,280	3,380	1.37	591	96
Cleveland--Akron, OH CMSA	18,120	1,410	12,005	3,080	1.08	276	65
Minneapolis--St. Paul, MN--WI MSA	28,385	1,640	24,350	5,220	1.24	445	89
Phoenix--Mesa, AZ MSA	29,450	1,535	35,000	7,165	1.30	283	66

TABLE 30 CONTINUED

Seattle--Tacoma--Bremerton, WA CMSA	30,670	1,850	27,130	5,800	1.29	1,181	182
Miami--Fort Lauderdale, FL CMSA	41,035	2,105	52,160	7,500	1.37	973	169
Atlanta, GA MSA	47,830	2,525	44,825	7,570	1.35	911	159
Houston--Galveston--Brazoria, TX CMSA	48,000	2,550	42,350	7,455	1.33	603	101
Dallas--Fort Worth, TX CMSA	55,300	3,180	46,090	8,280	1.32	505	82
Detroit--Ann Arbor--Flint, MI CMSA	32,780	1,915	53,680	8,630	1.29	280	50
Boston--Worcester--Lawrence, MA--NH--ME--CT CMSA	40,000	2,550	35,515	7,200	1.26	1,765	364
Philadelphia--Wilmington--Atlantic City, PA--NJ--DE--MD CMSA	36,400	2,400	47,765	8,230	1.28	1,600	341
San Francisco--Oakland--San Jose, CA CMSA	49,850	2,480	30,725	5,280	1.42	2,460	423
Washington--Baltimore, D.C.--MD--VA--WV CMSA	39,045	2,075	41,575	6,175	1.39	2,380	465

TABLE 30 - FORT LAUDERDALE COMPARISON TO PEER CITIES

City/Region	CBD Level	City Level	Urbanized Level	Jobs Magnetism	Total
Boulder	X				1
Dallas					0
Kansas City					0
Phoenix					0
St. Paul					0
Pittsburgh		X			1
Milwaukee		X			1
Seattle		X			1
Houston					0
Washington, D.C.					0
Atlanta					0

TABLE 31 - MIAMI COMPARISON TO PEER CITIES

City/Region	CBD Level	City Level	Urbanized Level	MSA Level	Jobs Magnetism	Total
Dallas				X	X	2
Kansas City					X	1
Phoenix	X			X		2
Orlando					X	1
St. Paul					X	1
Pittsburgh	X					1
Milwaukee	X					1
Seattle						0
Houston				X		1
Washington, D.C.		X	X	X		3
Atlanta	X			X		2
Detroit	X			X	X	3
Indianapolis	X					1
Baltimore	X					1
Minneapolis	X	X				2
Philadelphia		X			X	1
Las Vegas			X			1

APPENDIX D: EVALUATION CRITERIA FOR STRATEGIES

This appendix presents the definitions and guiding questions for the evaluation criteria that form the basis of the analysis of strategies throughout this report. These criteria were adapted from a similar evaluation used in another project in which alternatives to make concurrency in Washington State more multimodal were evaluated. See Hallenbeck et al (2007) for further information.

DEFINITIONS AND GUIDING QUESTIONS FOR EACH STRATEGY

1.   Decrease in car trips demand (user, demand side)

Definition:

This criterion refers to "the degree to which an approach decreases the number of personal vehicle trips that travelers make" (Hallenbeck et. al., 2007: C-17).   This includes a decrease in total trips demand as well as a shift from vehicle-based travel to other modes of transportation such as mass transit, ride-share, bicycle or pedestrian travel.

Guiding questions:

- Does the approach increase the costs of vehicle-based trips?
- Does the strategy decrease the need to make trips?
- Does the strategy create incentives for travelers to use alternatives modes of transportation?
- Does the strategy subsidizes/decreases the prices of alternative modes of transportation to the final user?
- (Cost of car trips demand includes also parking, so question of does the approach decrease use of parking?

2.   Increase alternative modes of transportation supply (provider, supply side)

Definition:

This criterion refers to "the degree to which an approach successfully encourages the deployment and use of well-functioning transportation facilities that serve multiple modes of travel" such as "mass transit facilities and service, ride-share programs, and pedestrian and bicycle infrastructure" (Hallenbeck et. al., 2007: C-11).

Guiding questions:

- Does the strategy promote the development, expansion, or up-grading of the infrastructure needed to supply alternative modes of transportation?

- Does the strategy promote financial support for the regular operation of alternative modes of transportation?
- Does the strategy encourage better coordination among different alternative modes of transportation?
- Does the strategy subsidizes/decreases the costs to the providers of alternative modes of transportation?
- Does the strategy affect factors that can improve the provision of alternative modes of transportation such as densities, urban form patterns (e.g., mix land uses) or urban design (e.g., street connectivity)?

3. Cost efficiency (economic efficiency, social costs & benefits)

Definition:

This criterion pertains to the degree to which the benefits and costs of the strategy are balanced. The objective of cost efficiency is to maximize benefits and minimize costs. At this point benefit and costs should be defined in the economic sense in terms of the society including positive and negative (and tangible and intangible) externalities

Guiding questions:

- What are the main social benefits of the strategy?
- What are the main social costs of the strategy?
- From a general perspective and taking into account that some social benefits or costs are difficult to quantify, do benefits outweigh the costs?

4. Revenue generation (financial analysis)

Definition:

This refers to "the degree to which an approach can be used to generate public funds" (Hallenbeck et. al.: C-18). Ideally, these funds should be reinvested in parking or transportation. Here costs and revenues are defined in the financial sense and only pertain to the agency in charge of the strategy.

Guiding questions:

- Does the approach provide a means to raise money?
- Are these moneys allocated to the same agency that generates/collects them or do they go to the general fund?
- Can these moneys be earmarked for capital improvements or regular operation of parking facilities?
- Can these moneys be earmarked for capital improvements or regular operation of transit/transportation facilities?

- Is the approach financially self-sustainable for the agency in charge (i.e., are the revenues likely to outweigh the financial costs)?
- Are the revenues or costs subject to uncertain changes that can affect the financial sustainability of the strategy in the future?

5. Political acceptability and legality

Definition:

Political acceptability can be defined as "the degree to which an approach is acceptable to various political constituencies" (Hallenbeck et. al., 2007: C-06). Legality can be defined as the degree to which a strategy could 'withstand legal challenges from the private sector, the community or other jurisdictions' (Hallenbeck et. al., 2007: C-13)

Guiding questions:

- 'Does the approach touch on politically sensitive topics?' (Hallenbeck et. al., 2007: C-07)
- Are there stakeholders that are likely to see their interests affected with the strategy? (include here both positive and negative effects) If yes, do they have a direct say in decision making? Could they block (expedite) the implementation of the policy?
- Is it the approach clear and intelligible in a way that is easy to explain and 'sell' to the general public?
- Does the approach need a new institutional framework (for example in terms of coordination of jurisdictional/functional agencies)?
- Do jurisdictions or functional agencies have governability over the implementation and results of the strategy?
- Is the strategy compatible with current practices and policies?
- Does the approach need the enactment of new laws or the change of existent ones?
- "Is the approach robust legally, i.e., will it stand up in court?" (Hallenbeck et. al., 2007: C-13)
- "Does existing state legislation permit the approach under consideration? Do precedents set by case law impact the feasibility of the approach under consideration?" (Hallenbeck et. al., 2007: C-20)
- Is the approach flexible, i.e., can it change according to variations in the context?

6.   Degree of implementation

Definition

This criterion captures the current state of implementation of the strategy. Strategies that are not being implemented could have a higher priority in terms of public policy than strategies that have a high degree of implementation since the latter could only need reinforcement and control.

Guiding questions:

- Is the strategy being implemented right now in the CBDs?
- If yes, is the strategy being implemented to the standards suggested in our recommendations?
- Are there any flaws in the current implementation?
- Does the implementation need major changes?

7.   Overall 'desirability'

Definition:

This criterion summarizes the rest of the evaluation criteria providing information about the priority in terms of public policy of the strategy.

Guiding questions:

- For each specific CBD and strategy, how do the first 6 criteria compare? How each criterion can be weigh in relation to the rest in terms of priority?
- Based on the relative importance of the criteria for the CBD and the performance of the strategy in each criterion, what is the overall priority in terms of public policy?
- Is this something that can be done in a certain time period (Short-term vs. long-term) or planning horizon (short, medium, long)?

APPENDIX E: CBD PARKING INVENTORY

TABLE 32 – FORT LAUDERDALE ON-STREET PARKING

ID	NAME	LOCATION	HRS_OF_ENFORCEMENT	RATES	SPACES
1	NW 4 Street	NW 1 Ave to NW 2 Ave	8am - 6pm M-Sat	$0.50 / hr.	3
2	NW 4 Street	N Andrews to NE 1 Ave	8am - 6pm M-Sat	$0.50 / hr.	2
3	NE 4 Street	W of 3 Avenue	8am - 6pm M-F	$0.50 / hr.	2
4	NW 1 Avenue	NW 4 St to NW 2 St	8am - 6pm M-F	$0.50 / hr.	15
5	NW 2 Street	NW Flagler Ave to NW 1 Ave	8am - 6pm M-F	$0.50 / hr.	3
6	NW 2 Street	NW 1 Ave to N Andrews Ave	8am - 6pm M-F	$0.50 / hr.	3
7	NE 3 Street	NE 3 Avenue to NE 7 Ave	8am - 6pm M-F	$0.50 / hr.	34
8	NW 4 Avenue	Between NW 2 Ave and W Broward Blvd	24/7		3
9	NW 2 Avenue	NW 2 St to W Broward Blvd	24/7	$0.50 / hr.	21
10	NW 1 Street	NW 1 Ave to N Andrews Ave	8am - 6pm M-Sat	$0.50 / hr.	8
11	NE 1 Street	N Andrews Ave	8am - 6pm M-Sat	$1.25 / hr.	4
12	NE 1 Street	NE 3 Ave to US 1	8am - 6pm M-Sat	$1.25 / hr.	7
13	SW 3 Avenue	W Broward to SW 2 St	24/7	$1.25 / hr.	8
14	SW 2 Avenue	Broward Blvd - 2 St	24/7	$1.25 / hr.	30
15	SW 2 Street	SW 5 Ave to SW 4 Ave	24/7	$1.25 / hr.	6
16	SW 3 Avenue	2 St to Alley	24/7	$1.25 / hr.	6
17	SW 2 Street	SW 4 Ave to SW 3 Ave	24/7	$1.25 / hr.	12

TABLE 33 CONTINUED

18	SW 4 Avenue	SE 2 St to River	24/7	$1.25 / hr.	8
19	SW 2 Avenue	SW 2 St to Alley	24/7	$1.25 / hr.	20
20	SW 1 Avenue	W Broward Blvd to W Las Olas Blvd	24/7	$1.25 / hr.	17
21	SE 1 Street	SE 1 Ave to SE 3 Ave	24/7	$1.25 / hr.	27
22	SE 1 Avenue	E Broward Blvd to E Las Olas	24/7	$1.25 / hr.	39
23	SE 3 Avenue	SE 1 St to SE 2 St	24/7	$1.25 / hr.	6
24	SE 5 Avenue	North of SE 2 St	24/7	$1.25 / hr.	6
25	SE 2 Street	SE 3 Ave to US 1	24/7	$1.25 / hr.	24
26	SE 2 Avenue	SE 1 St to E Las Olas Blvd	24/7	$1.25 / hr.	24
27	SE 5 Avenue	SE 2 St to E Las Olas Blvd	24/7	$1.25 / hr.	18
28	SE 6 Avenue	SE 2 St to Las Olas Blvd	24/7	$1.25 / hr.	10
29	East Las Olas	SE 3 Ave to SE 4 Ave	6:30pm - 3am M-Th and Fri 6:30pm - Mon 3am	$1.50 / hr.	40
30	East Las Olas	SE 4 Ave to SE 10 Ter	11am-3am M-Thur and Fri 11am-Mon 3am	$1.50 / hr.	12
31	SE 5 Avenue	E Las Olas Blvd to SE 4 St	24/7	$1.25 / hr.	10
32	SW 5 Street	SW 1 Ave to Andrews Ave	8am - 6pm M-Sat	$0.50 / hr.	4
33	Andrews Avenue	SE 5 St to SE 6 St	8am - 6pm M-Sat	$0.50 / hr.	6
34	SW 6 Street	SW 1 Ave to S Andrews Ave	8am - 6pm M-Sat	$0.50 / hr.	8
35	SE 6 Street	S Andrews Ave to US 1	8am - 6pm M-Sat	$1.25 / hr.	52
36	SW 7 Street	SW 1 Ave to S Andrews Ave	8am - 6pm M-Sat	$0.50 / hr.	21

TABLE 33 – FORT LAUDERDALE PUBLIC OFF-STREET PARKING

ID	NAME	LOCATION	RATES	HRS OF ENFORCEMENT	OPERATOR	SPACES	FACILITY	LEVELS
1	J Lot	121 N Andrews Ave	$0.50 / hr.	8am - 6pm M-Sat	City of Fort Lauderdale	27	Lot	1
2	Arts & Science District Garage	101 SW 5 Ave	Variable $1 / hr. - $12 per entry $7 6am-9pm	24/7	City of Fort Lauderdale	986	Garage	3
3	City Park Garage	150 SE 2 St	$1 / hr.	24/7	City of Fort Lauderdale	2366	Garage	7
4	B-2 (Andrews Ave Bridge Lot)	10 S New River Dry E	$1.25 / hr.	24/7	City of Fort Lauderdale	20	Lot	1
5	FRB Lot	300 NW 1 Avenue	$0.25 / hr.	8 am - 6 pm M-F	City of Fort Lauderdale	30	Lot	1
6	County Lot II	80 SW 1st Ave	Variable $0.50 / hr. - $7 flat rate	24/7	City of Fort Lauderdale	145	Lot	1
7	County Lot I	400 SE 1st Ave	$0.75 / hr.	24/7	City of Fort Lauderdale	43	Lot	1
8	B-4 (3 Ave Bridge Lot)	300 S. New River Dr.	$1.25 / hr.	24/7	City of Fort Lauderdale	3	Lot	1
9	River House Lot	220 SW 3 Ave	$1.25 / hr.	24/7	City of Fort Lauderdale	29	Lot	1
10	Lot	NW 4 St	Permit Parking Only		City of Fort Lauderdale	73	Lot	1
11	City Hall Garage	100 N Andrews Ave	Variable $0.50/hr. - $0.75/hr. 1st Floor Rest 204	8am - 6pm M-F	City of Fort Lauderdale	169	Garage	4
12	Broward County Govt Center	151 SW 2 St	Variable $2 / hr. - $12 flat rate	24/7	City of Fort Lauderdale	1147	Garage	4

TABLE 34 – FORT LAUDERDALE COMMERCIAL OFF-STREET PARKING

ID	NAME	LOCATION	RATES	HRS OF ENFORCEMENT	OPERATOR	SPACES	FORMALALITY	FACILITY	LEVELS
1	O Lot	100 N Andrews Ave	Variable $0.50/hr. - $0.75/hr.	8 am - 6 pm M-F	Lanier Parking	169	Formal	Lot	1
2	Stiles Garage	200 Las Olas	Variable $4 / hr. - $10 flat rate	M-W 7am - 11pm; Thur-Sat 24hrs Every day; Sun 7am - 11pm	USA Parking	522	Formal	Garage	6
3	One River Plaza	305 S Andrews Ave	Variable $3 / hr. - $7 / 3hrs	24 Hours Everyday	Las Olas Park Place	490	Formal	Garage	7
4	Valley Bank	300 W Broward Blvd	Variable $3 all-day - $10 flat rate	24 Hours Everyday	Parking Company of America	86	Formal	Lot	1
5	Voo Doo Lot	21 SW 3 Ave	Variable $3 all-day - $10 flat rate	24 Hours Everyday	Parking Company of America	89	Formal	Lot	1
6	Voo Doo Lot II	50 SW 3 Ave	Variable $3 all-day - $10 flat rate	24 Hours Everyday	Parking Company of America	134	Lesser Intensity	Lot	1
7	Voo Doo Lot III	301 SW 2 St	Variable $3 all-day - $10 flat rate (Parking Permit Only)	24 Hours Everyday	Parking Company of America	76	Formal	Lot	1
8	PNC Bank	200 E Broward Blvd	$4 first hr. $3/each additional hr.	7 am - 7 pm except Sat/Sun	USA Parking	540	Formal	Garage	5
9	Broward Financial Centre	500 E Broward Blvd	$4 first hr. $2/each additional hr.	7 am - 8 pm except Sat/Sun	In-House	850	Formal	Garage	5
10	Bank of America Lot	201 SE 2 Ave	$6 all-day	7 am - 7 pm except Sat/Sun	Laz Parking	76	Formal	Lot	1
11	Las Olas Center	350 E Las Olas Blvd	$4 first hr. $2/each additional hr.	7 am - 10 pm except Sat/Sun	Ampco	727	Formal	Garage	6
12	Las Olas Center	450 Las Olas Blvd	Variable $4 / hr. - $4 flat rate	M-F 7am - 11pm; Sat 4pm - 10pm	Ampco	579	Formal	Garage	5

TABLE 35 CONTINUED

13	Las Olas Place	301 E Las Olas Blvd	$4 first hr. $2/each additional hr.	M-F 7am - 11:30pm; Sat 9am - 2am; Sun 10am - 9pm	USA Parking	624	Formal	Garage	4
14	Bank of America	401 E Las Olas Blvd	$4 first hr. $2/each additional hr. $5 flat rate	6 am - 6 pm except Sat/Sun	Lanier Parking	1080	Formal	Garage	5
15	SunTrust Bank	501 E Las Olas Blvd	$2 first hr. $1/each additional hr.	7 am - 6 pm except Sat/Sun	Parking Company of America	423	Formal	Garage	4
16	Regions Bank	100 SE 3 Ave	$4 first hr. $3/each additional hr. (Private Bank Clients)	7 am - 8:30 pm except Sat/Sun	Central Parking	520	Formal	Garage	1
17	100 Plaza	100 NE 3 Ave	$4 first hr. $2/each additional hr.	7 am - 8 pm except Sat/Sun	USA Parking	522	Formal	Garage	5
18	Tower 101	101 NE 3 Ave	$6 first hr. $4/each additional hr.	7 am - 7 pm except Sat/Sun	Lanier Parking	428	Formal	Garage	7
19	110 Tower Garage	110 SE 6 St	$6 first hr. $4/each additional hr.	24 Hours Everyday	Wackenhut	900	Formal	Garage	7
20	EZ Park	614 SE 3 Ave	$2/hr.	7 am - 5 pm except Sat/Sun	EZ Parking System	132		Lot	1
21	Courthouse Lot	276 SE 6 Ct	$5 all-day	7 am - 5 pm except Sat/Sun	EZ Parking System	201		Lot	1
22	Courthouse Parking	SE 6 Ct			In-House	47		Lot	1
23	Lot	SW 7 St	$5-$8	24/7	Lanier Parking	207	Formal	Lot	1
24	Lot	S Andrews Ave	Not sure if public use		Private	63		Lot	1
25	Lot	E Las Olas Blvd	Valet		Private	147	Lesser Intensity	Lot	1
26	One Financial Plaza	SE 2 St			Central Parking	883	Formal	Garage	4
27	Church Lot	SE 3 Ave-SE 2 St	$2 / hr.	24 Hours Everyday	Parking Company of America	107	Formal	Lot	1

TABLE 35 CONTINUED

28	Sun Sentinel Garage	Las Olas & SE 2 Ave				800	Formal	Garage	0
29		S 6 St and E 1 Ave	$5/hr			0	Formal	Lot	0

TABLE 35 - MIAMI ON-STREET PARKING

ID	NAME	LOCATION	RATES	HRS_OF_ENFORCEMENT	SPACES
1	NE 8 St	N Miami Ave to NE 1 Ave	$1.50 / hr	24/7	6
2	NE 8 St	NE 1 Ave to NE 2 Ave	$1.50 / hr	24/7	30
3	NE 1 Ave	NE 8 St to NE 7 St	$1.50 / hr	24/7	15
4	NE 2 Ave	NE 8 St to NE 7 St	$1.50 / hr	24/7	7
5	NE 7 St	NE 1 Ave to NE 2 Ave	$1.50 / hr	24/7	30
6	NW 5 St	I-95 to NW 2 Ave	$1.50 / hr	Sun7am-Sat 2am	13
7	NW 1 Ave	NW 6 St to NW 5 St	$1.50 / hr	24/7	10
8	NW 6 St	NW 1 Ave to N Miami Ave	$1.50 / hr	24/7	5
9	N Miami Ave	N 6 St to N 5 St	$1.50 / hr	24/7	12
10	NE 1 Ave	NE 6 St to NE 5 St	$1.50 / hr	24/7	14
11	NW 2 Ave	NW 5 St to NW 3 St	$1.50 / hr	Sun7am-Sat 2am	35
12	NW 4 St	NW 2 Ave to NW Ct	$1.50 / hr	Sun7am-Sat 2am	35
13	N Miami Ave	N 5 St to N 4 St	$1.50 / hr	24/7	12
14	NE 1 Ave	NE 5 St to NE 4 St	$1.50 / hr	24/7	13
15	NE 2 Ave	NE 5 St to NE 4 St	$1.50 / hr	24/7	12
17	NE 2 Ave	NW 4 St to NW 3 St	$1.50 / hr	24/7	21
18	N 3 St	NW 1 Ave to NE 1 Ave	$1.50 / hr	24/7	12
19	NW 3 St	NE 1 Ave to NE 2 Ave	$1.50 / hr	24/7	5

TABLE 36 CONTINUED

20	NE 3 St	NE 2 Ave to Biscayne	$1.50 / hr	24/7	23
21	NW 1 Ave	NW 3 St to NW 2 St	$1.50 / hr	24/7	20
22	N Miami Ave	NW 3 St to NW 2 St	$1.50 / hr	24/7	12
23	NE 2 Ave	NW 3 St to NW 2 St	$1.50 / hr	24/7	26
24	N 2 St	NW 1 Ave to NE 3 Ave	$1.50 / hr	24/7	12
25	NW 1 St	NW 3 Ave to NW 1 Ct	$1.50 / hr	24/7	8
26	N Miami Ave	N 3 St to Flagler	$1.50 / hr	24/7	25
27	NW 1 Ave	NW Miami Ct	$1.50 / hr	24/7	9
28	N 1 St	NW 1 Ave to NE 3 Ave	$1.50 / hr	Sun7am-Sat 2am	50
29	NE 3 Ave	NE 2 S to E Flagler St	$1.50 / hr	24/7	30
30	NE 1 St	NE 3 Ave to Biscayne Blvd	$1.50 / hr	24/7	6
31	W Flager St	N River Dr to NW 1 Ave	$1.50 / hr	24/7	35
32	W Flagler St	W 1 Ave to N Miami Ave	$1.50 / hr	24/7	22
33	E Flagler St	S Miami Ave to Biscayne	$1.50 / hr	24/7	90
34	SW 2 Ave	W Flagler to SW 1 St	$1.50 / hr	24/7	6
35	SE 1 Ave	South of E Flagler	$1.50 / hr	24/7	3
36	S 1 St	SW 2 Ave to SE 2 Ave	$1.50 / hr	24/7	35
37	SE 1 Ave	SE 1 St to SE 2 St	$1.50 / hr	24/7	3
38	SE 1 St	SE 2 Ave to SE 3 Ave	$1.50 / hr	24/7	22

TABLE 36 CONTINUED

39	SE 3 Ave	E Flagler to SE 2 St	$1.50 / hr	24/7	16
40	SE 1 St	SE 3 Ave to Biscayne Blvd	$1.50 / hr	24/7	6
41	SW 1 Ct	SW 1 St to SW 4 St	$1.25 / hr	Sun7am-Sat 2am	5
42	SW 2 St	SW 2 Ave to S Miami Ave	$1.50 / hr	Sun7am-Sat 2am	50
43	SW 3 St	SW 2 Ave to S Miami Ave	$1.25 / hr	Sun7am-Sat 2am	20

TABLE 36 - MIAMI OFF-STREET PARKING

ID	NAME	LOCATION	RATE	HRS OF ENFORCEMENT	OPERATOR	SPACES	FACILITY	LEVELS
1	Miami-Dade Cultural Center	50 NW 2 Ave	$4 / hr	M-F 6A-7P, S 8A-5P, Sun 11-5	MPA	623	Garage	6
2	140 Flagler Building	140 West Flagler St	$4 / hr	M-F 6:30A-6:30P	Miami-Dade GSA	275	Garage	7
3	Garage 5	275 NW 2 Street	$0.40 / hr	24/7	MPA	78	Garage	7
4	Miami-Dade North Jury Lot	111 NW 3 Street	$0.63 / hr	M-F 6A-4P, S/Sun Closed	MPA	338	Lot	0
5	Garage 2 Cultural Center Garage	90 SW 1st Street	$6 / hr	M-F 6A-Midnight, Sat 6A-10P	MPA	459	Garage	7
6	Garage 3 College Station Garage	190 NE 3rd Street	$4 / hr	24/7	MPA	1439	Garage	7
7	Lot 43	90 SW 2nd Street	$5 / hr	M-F 7AM-7PM	MPA	66	Lot	0
8	Lot A-FEC (Government Center)	200 NW 1st Ave	$4 / hr	M-F 7A-8P, Sat 7A-5P, Sun Closed	MPA	271	Lot	0
9	225 SE 2nd Street	225 SE 2 St	$6 / hr	Mon-Sat 24 hrs.	MPA	550	Garage	7
10	Lot 19-1	Biscayne-NE 4-5 St	$3 / hr	M-Sun 6AM-2AM	MPA	44	Lot	0
11	Lot 19-2	Biscayne-NE 3-4 St	$3 / hr		MPA	42	Lot	0
12	Lot 19-3	Biscayne-NE 2-3 St	$3 / hr		MPA	51	Lot	0
13	Lot 19-4	Biscayn-NE1-2 St	$3 / hr		MPA	51	Lot	0
14	Lot 19-5	Biscayn-NE1 & E Flagler	$3 / hr		MPA	44	Lot	0
15	Lot 19-6	Biscayn-SE1 & E Flagler	$3 / hr		MPA	29	Lot	0
16	Lot 20	SE 2 St & S Biscayne	Unknown		MPA	8	Lot	0
17	Surface Lot 33	SW 2 Ave	$4.50 / hr	M-F 7AM-7PM, S/Sun Closed	MPA	204	Lot	0
18	Surface Lot 15	SW 2 Ave	$4.50 / hr		MPA	273	Lot	0
19	Lot II	Under I-95	Unknown		MPA	322	Lot	0
20	Garage 1 Courthouse Center	40 NW 3rd Street	Unknown	M-F 6A-Midnight, Sat 6A-10P	MPA	844	Garage	12
21	MPA Parking	120 NE 2 St	$3 / hr		MPA	78	Lot	0
22	Surface Lot	NW 1 Ave & NW 6 St	Unknown		MPA	267	Lot	0
23	Surface Lot	NW 1 Ave & NW 5 St	Unknown	During Events	MPA	252	Lot	0

TABLE 36 CONTINUED

24	Surface Lot 16	River Dr & SW 2 St	$1 / hr		MPA	110	Lot	0
25	Surface Lot 14	SW 1 St and Flager	Unknown		MPA	215	Lot	0
26	Surface Lot 32	NW3 Av-Flagler to 1ST	$1.25 / hr	M-Sun 7AM-6PM	MPA	29	Lot	0
27	Surface Lot 36	SW 1 Ct & SW 2 St	Unknown		MPA	21	Lot	0
28	Surface Lot 34	SW 1 Ct & SW 2 St	Unknown		MPA	53	Lot	0
29	Surface Lot 38	SW 1 Ct & SW 2 St	Unknown		MPA	148	Lot	0
30	Cultural Arts Lot	SW 2 St	$6 / hr	M-F 6A-Midnight, Sat 6A-10P	MPA	81	Lot	0
31	Knight Center Garage	100 SE 2nd St			MPA	1370	Garage	0

TABLE 37 - MIAMI COMMERCIAL OFF-STREET PARKING

ID	NAME	LOCATION	RATE	HRS OF ENFORCEMENT	OPERATOR	SPACES	FORMALALITY	FACILITY	LEVELS
1	SunTrust Annex Garage	270 NW 2 Street	$6 / hr	M-F 6A-9P, S/Sun Closed	USA Parking	1080	Formal	Garage	7
2	Surface Lot	NE 2 St	$0.63 / hr		American Car Parks	137	Formal	Lot	0
3	Impark Garage	100 SE 2nd Street	$6 / hr	24/7	Impark	1390	Formal	Garage	7
4	Surface Lot	50 SW 2nd Street	$0.63 / hr	M-Sun 7AM-6PM	Park West Parking	215	Formal	Lot	0
5	35 SW 1st Street	35 SW 1st Street	$4 / hr	M-F 6A-8P, Sat 7A-6P	Central Parking System	50	Formal	Lot	0
6	29 NW 1st Street	29 NW 1st Street	$5 / hr	M-F 7A-6P, S/Sun 24/7	Central Parking System	147	Formal	Lot	0
7	Parking in the Shade	54 NE 2nd Street	$0.63 / hr	24/7	Central Parking System	46	Formal	Lot	0
8	Alfred Dupot Bldg.	176 NE 1 ST	$10 / hr	M-F 7A-12A, Sat 7A-9P	Consolidated Parking	284	Formal	Garage	4
9	724 NE 2nd Ave	724 NE 2nd Ave	$2 / hr	During Events	Park West Parking	33	Formal	Lot	0
10	725 NE 1st Ave	725 NE 1st Ave	$2 / hr	During Events	Park West Parking	40	Lesser Intensity	Lot	0
11	601 N Miami Ave	601 N Miami Ave	$3 / hr	M-F 5AM-2PM	Park West Parking	80	Lesser Intensity	Lot	0
12	125 NE 6th Street	125 NE 6th Street	Unknown	During Events	Park West Parking	40	Lesser Intensity	Lot	0
13	45 SE 2nd Street	45 SE 2nd Street	$0.38 / hr	Mon-Sun 7AM-10PM	South Florida Parking Association	80	Formal	Lot	0
14	Courthouse - Miami-Dade County	175 NW 1 St	$1.25 / hr		Central Parking System	54	Formal	Lot	0
15	Executive Parking Garage	SE 1 St	Unknown		Miami Parking Management	660	Formal	Garage	4

TABLE 38 CONTINUED

16	SunTrust Garage	SE 1 St	$8 / hr			707	Formal	Garage	7
17	Impark Garage	SE 2 St	Unknown		City Parking of Florida	459	Formal	Garage	3
18	Private Garage	SE 2 St	$5 / hr		TransPark	187	Formal	Lot	0
19	Surface Lot	NE 1 St	$0.63 / hr			50	Formal	Lot	0
20	Surface Lot	SE 1 St	Unknown			41	Formal	Lot	0
21	Bank of America Museum Tower	140 W Flagler	$2.50 / hr			2409	Formal	Garage	11
22	Impark Surface Lot	SW 1 St	$8 / hr		Impark	51	Formal	Lot	0
23	Miami Quality Parking	SW 2 Ave	$8 / hr		Impark	161	Formal	Lot	0
24	Miami Dade County Surface Lot	270 NW 2 St	$0.23 / hr			44	Formal	Lot	0
25	VIP Security Parking	50 NE 3 St	$0.63 / hr		American Car Parks	327	Formal	Lot	0
26	New World Tower Garage	100 Biscayne Blvd	$6 / hr		Denison Parking	924	Formal	Garage	12
27	American Car Parks Lot	Biscayne & NE 3 St	$0.63 / hr		American Car Parks	194	Formal	Lot	0
28	Surface Lot	NE 5 St	$0.63 / hr			316	Formal	Lot	0
29	Church Lot	NE 2 Ave & NE 5 St	$3 / hr			377	Formal	Lot	0
30	Surface Lot	NE 1 Ave & NE 7 St	Unknown			174	Lesser Intensity	Lot	0
31	Surface Lot	NE 1 Ave & NE 8 St	$2 / hr			148	Lesser Intensity	Lot	0
32	Surface Lot	700 Biscayne Blvd	$1.50 / hr	During Events	AAA	300	Formal	Lot	0
33	Surface Lot	NE 2 Ave & NE 7 St	Unknown			62	Lesser Intensity	Lot	0
34	Commercial Garage	NE 5 St	Unknown		American Car Parks	2827	Formal	Garage	11
35	United Methodist Church Lot	NE 5 St	$5/day			70	Formal	Lot	0
36	Private Lot	NE 4 St	Unknown			48	Formal	Lot	0

TABLE 38 CONTINUED

37	Lot		$5 / hr		South Florida Parking Association	52	Formal	Lot	0
38	Lot	SW 3 St	$0.75 / hr			35	Formal	Lot	0
39		312 SE 2 St	Unknown			2327	Formal	Garage	13
40	Private Lot	SW 3 St and SW 2 Ave	$0.50 / hr		Private	28	Formal	Lot	0
41	Private Lot	NE 1 St	Unknown		Private	0	Formal	Lot	0
42	Courthouse East	22 NW 1 ST	Unknown			0	Formal	Lot	0
43	Robert's Garage	35 SW 1 St	$3.99 / hr		Central Parking System	335	Formal	Garage	6
44	Miami Center	201 Biscayne Ave			Intercontinental Miami	300	Formal	Garage	0
45	Watts' Garage	26 SE 1st St				331	Formal	Garage	0
46	Grand Central	700 N Miami Ave				250	Formal	Lot	0
47	Cromar	701 N Miami Ave				200	Formal	Lot	0