PARKING AND
TRANSIT POLICY STUDY

Technical Memorandum No. 2
Evaluation of Parking and Transit Policies

Prepared for the
Florida Department of Transportation
Office of Public Transportation

by the
Center for Urban Transportation Research
College of Engineering
University of South Florida

May 1993
PREFACE

This is the second of three technical memoranda regarding parking and transit policies to be produced by the Center for Urban Transportation Research (CUTR) for the Florida Department of Transportation. These memoranda comprise the Parking and Transit Policy Study, which is an investigation of the relationship between local parking and transit policies. It will also identify methods for coordinating policies in order to increase transit use and the cost-effectiveness of public investments in parking and transit.

Technical Memorandum No. 1 provided an overview of urban transit and parking policies, programs, and available data for urban areas in Florida with transit systems that are eligible for Federal Transit Administration Section 9 subsidies. Technical Memorandum No. 2 evaluates parking and transit coordination efforts in other states, as well as the impacts of current parking and transit policies in Florida. Technical Memorandum No. 3 will identify complementary transit and parking policies and will recommend a strategy for implementation by the appropriate levels of government.
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PARKING AND TRANSIT POLICY STUDY
Technical Memorandum No. 2

INTRODUCTION

The purpose of the Parking and Transit Policy Study is:

"To investigate the relationship between local parking policies and local transit policies and identify approaches for coordinating policies to increase transit use and increase the cost effectiveness of public investments in parking and transit."

Seven tasks were developed to accomplish this purpose. The efforts performed in these tasks are to be documented in three technical memoranda and summarized in an executive summary. This report is the second of the three technical memoranda.

The first technical memorandum contains a review of literature on parking management measures. An overview of parking and transit policies and programs in four Florida cities--Miami, Orlando, Ft. Lauderdale, and Ft. Myers--is also presented. These cities were selected from the eighteen (18) areas in Florida that in 1992 had a public transit operator eligible for Federal Transit Administration (FTA) Section 9 funding.

This report presents results of a comprehensive evaluation of parking management programs and parking/transit coordination efforts in the four Florida cities and in other states. The purpose of this review is threefold:

• to identify the types of efforts undertaken in these areas;
• to evaluate the impacts of these efforts; and
• to use the information gathered to develop actions that could support complementary transit and parking policies in Florida. (This purpose will be addressed in the third technical memorandum).

The types of quantifiable data envisioned for use in evaluating impacts of various programs and polices, such as changes in transit ridership resulting from changes in parking prices, is very limited and, in most cases, nonexistent. As a result, the evaluation of impacts is based on information obtained through interviews with local officials.
The third technical memorandum will analyze major parking and policy issues and outline a range of actions to support transit and parking policies. That report will present recommendations for implementing policies by appropriate levels of government.

**PROBLEM STATEMENT**

Local governments that do not coordinate parking and transit policies can unintentionally reduce the competitiveness of transit as a travel mode because certain parking policies may provide incentives for automobile use.

Public transit and the private automobile (and parking facilities used for their storage), while competing travel modes, are both essential components of a city's transportation infrastructure. Of the two modes, however, public transit can be significantly more efficient--it can move more people at a lower unit cost per trip and with less damage to the environment. Yet in terms of personal choice, the private automobile is by far the preferred mode of travel.

Recognizing the automobile's importance and the preference for it as a travel mode, local governments try to establish parking policies that ensure an adequate supply of well-placed parking. These policies are developed without considering public transit as an alternative means of providing access or how these policies may affect public transit ridership. As a result, parking policies provide incentives for automobile use (e.g., parking that is close to the trip terminus, or parking that is inexpensive), which makes it difficult for public transit systems to maintain current travel market share and even more difficult to compete for new riders.

The private sector can also contribute to public transit's reduced competitiveness. Lending institutions have required developers to provide a minimum number of parking spaces in proposed developments. Lenders perceive that the ability of a developer to attract tenants is greatly improved by the availability of on-site parking. Transit is seldom viewed as an alternative or significant supplement to the access provided by the automobile.

Because public transit is a more efficient transportation mode, it is clear that efforts in Florida should be undertaken to ensure its viability and increase its share of the travel market. Coordinating parking and transit policies is one important step in meeting these goals and is the focus of this study.
COMPARISON OF TRAVEL MARKET AND MODE CHOICE FACTORS IN FLORIDA AND NATIONAL CITIES

Parking strategies can be an effective means of reducing automobile trips and increasing transit and ridesharing usage. However, strategies that are successful in one city may not be successful in another. The success or failure of parking strategies largely depend on characteristics of a city’s travel market; that is, characteristics that play an important role in determining mode choice. Examples of these characteristics include population and CBD employment density, level of transit service, convenience and comfort of transit, and CBD parking supply and price.

This section of the report presents results of an analysis of factors that may account for differences in travel markets and mode choices among different metropolitan areas. The analysis involves a review of demographic, economic, and mode-related data from the 52 selected U.S. cities. As shown in Figure 1, these cities include the 16 cities in Florida that have public transit operators and 36 cities in other states with a Section 9 public transit operator. The selected 52 cities are listed in Table 1, along with population, employment, parking, and transit data.

FIGURE 1. Selected U.S. Cities.

The 36 cities outside the state were selected based on population size and data availability. The cities are grouped into three population groups: large cities (i.e., cities with an urban area
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<td>10,822,446</td>
</tr>
<tr>
<td>Washington D.C.</td>
<td>3,923,574</td>
<td>3,363,031</td>
<td>608,900</td>
<td>2,216,100</td>
<td>887,600</td>
<td>312,000</td>
<td>357,508,151</td>
</tr>
<tr>
<td>W. Palm Beach</td>
<td>863,518</td>
<td>794,848</td>
<td>67,643</td>
<td>420,400</td>
<td>13,000</td>
<td>13,500</td>
<td>2,413,887</td>
</tr>
</tbody>
</table>

Telephone surveys and interviews with downtown development authorities, chambers of commerce, city parking divisions, and transit authorities.

Notes: Shaded areas indicate cities included in the comprehensive review of parking and transit policies. County populations used instead of metropolitan area populations for St. Petersburg and Tampa.

Definitions:
Metropolitan Area Population - persons living within a geographic area with a large population nucleus together with adjacent communities that have a high degree of economic and social integration with the nucleus.
Urbanized Area Population - persons living within an incorporated place and adjacent densely settled surrounding area that together have a minimum population of 50,000.
City Population - persons living within the boundaries of the central city.
CBD - central business district, the commercial center of a city.
n/a - not available.
population exceeding 1.8 million persons), medium cities (i.e., cities with an urban area population between 500,000 and 1.8 million persons), and small cities (i.e., cities with an urban area population less than 500,000 persons). The basic criteria used for selecting the 36 cities was to include more non-Florida cities than Florida cities in each of the three population groups. This would help prevent the Florida cities' data from dominating and skewing the comparison. The cities are also separated into rail cities and non-rail cities because travel markets of rail cities and non-rail cities can be significantly different. Of the 36 non-Florida cities, 17 cities were also selected for a comprehensive review of parking and transit coordination efforts (three additional cities are included in the review but are not included in this analysis because data for the three cities were not available; the results of the comprehensive review are presented in the next section of this report).

Figure 2 shows the factors that affect mode choice. These factors can be grouped into two areas, consumer characteristics and modal characteristics. Consumer characteristics are basically demand-side factors, that is, these characteristics (e.g., personal income, automobile ownership, and employment) shape consumer tastes and preferences for certain "goods" in the marketplace. Modal attributes, on the other hand, are supply-side factors that define the "good" in the marketplace in terms of quantity, quality, and price. There are indirect factors that also

![FIGURE 2. Factors Affecting Mode Choice.](attachment:image.png)
affect both consumer and modal characteristics. For example, population density does not directly affect a person's decision to use transit, but population density does affect transit's level of service, which is a factor that potential riders consider in their mode decisions.

Both the supply-side and demand-side mode choice factors form the unique travel market of an area. Some areas have travel markets that are more favorable for transit than others (i.e., travel market conditions are such that transit can capture a higher share of total trips than less favorable travel markets).

Several factors that directly or indirectly affect mode choice were analyzed for the 52 cities. These factors include urban area population, CBD employment, CBD parking supply, population density, percent of metropolitan area employment in the CBD, downtown parking spaces per employee, and average unsubsidized monthly parking rates. These factors, as well as unlinked transit trips and transit trips per capita, are shown in Figures 3 through 11.

Figures 3 to 6 show population, employment, transit trips, and parking supply respectively, for the 52 cities. Figure 7 shows persons per square mile, which is a measure of population density. This factor positively affects transit ridership. In other words, densely populated areas are favorable for transit service. Figure 8 shows the percent of metropolitan area employment in the CBD. This ratio measures the concentration of employment within the CBD and indicates the relative strength of the CBD as a regional attractor of work trips. A higher CBD employment concentration is a condition that favors transit use. Both population density and CBD employment concentration are proxy measures of the degree of urban sprawl in an area. Downtown parking spaces per employee, shown in Figure 9, is a measure of downtown parking supply. A large supply of parking is a factor that favors automobile use, depending upon the demand for and price of parking. Figure 10 shows another parking measure, average unsubsidized monthly parking rates. These rates are an overall CBD average for off-street parking. The rates should be viewed with caution. This information is not generally available or well-known in any city; in many cases, local officials provided a "best guess" estimate. Further, the rates do not represent what is actually paid by parkers, since most employers subsidize employee parking costs. Viewed in a broader context, however, these rates reasonably show the relative cost differences among the cities, because employer subsidization of parking is common in all areas of the U.S. Parking rates have a positive relationship with transit usage; if parking rates go up, there is a tendency for automobile commuters to shift to other modes or to alter commuting habits (e.g., switch to carpooling). Figure 11 shows transit trips per capita for the cities.
These figures indicate that the travel market factors in Florida are not as favorable for transit as they are in some other states. Population and employment patterns are dispersed, and parking is plentiful and relatively inexpensive. The population densities of ten of the sixteen Florida cities are below the median values in the three city size groups. Similarly, more than half of the Florida cities are below the median values for the percent of metropolitan area employment in the CBD, indicating that employment is geographically dispersed in Florida's metropolitan areas. Six of the nine Florida cities with parking data available were above the median value of downtown parking spaces per downtown employee, and all (eleven) of the cities with parking rate data were below the median of the three city size groups for average monthly unsubsidized parking rates. The last figure in this series shows transit trips per capita. The majority of the Florida cities fall below the median for this measure in both the city size groupings and the rail city/non-rail city groupings.

Research conducted for this study verifies the relationship of these travel market characteristics on transit usage. Figures 12, 13, 14, and 15 plot transit trips per capita with population density, CBD employment concentration, parking supply, and parking rates, respectively. The figures graphically illustrate a basic linear relationship between transit trips per capita and each travel market characteristic. It is also clear in each figure that nearly all of the Florida cities are concentrated in the most unfavorable sectors of the graph.

Four multi-variate regression runs were made using transit trips per capita as the dependent variable and combinations of population density, employment concentration, parking supply, and parking rates as independent variables. The city's status as a rail or non-rail city was used as an independent "dummy" variable in each regression run. The results of the regression runs are shown in Table 2. With 33 cities in the analysis (data were not available for all 52 cities), the regression runs achieved an R-square of between .708 and .723, indicating that the various combinations of independent variables were very good predictors of transit trips per capita. T-values that exceed 2.0 generally indicate that the independent variable is important in explaining the relationship. In the regression runs, population density and rail vs. non-rail status were important variables. The t-values for employment concentration were not as high. Parking supply and rates were less important in explaining the relationship than the variables related to population and employment densities and rail status, but when removed from the regression equation, the R-square decreased.

This analysis illustrates the effects of certain market conditions on transit usage and suggests that the market conditions in Florida are not favorable for transit. Perhaps the biggest
factor affecting transit market conditions in the state are dispersed development patterns. These patterns have created an environment in which most Floridians need an automobile for nearly every type of trip. Implementation of the state’s growth management legislation is a major step toward improving this situation. Addressing the problems associated with local parking policies that provide incentives for automobile use is an important step that is supportive of the state’s growth management initiatives.

Table 2. Regression Analysis Results

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Independent Variables</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
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<tbody>
<tr>
<td>TRANTRIP</td>
<td>POPDEN</td>
<td>0.0040</td>
<td>53.7394</td>
<td>11.0015</td>
<td>0.0775</td>
<td>21.5712</td>
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<td></td>
<td>(2.9439)</td>
<td>(1.2501)</td>
<td>(0.7968)</td>
<td>(0.9603)</td>
<td>(2.5681)</td>
<td></td>
</tr>
<tr>
<td>TRANTRIP</td>
<td>EMPCON</td>
<td>0.0047</td>
<td>55.4201</td>
<td>10.0168</td>
<td>0.0728</td>
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<tr>
<td></td>
<td>(4.1284)</td>
<td>(1.2921)</td>
<td>(0.7285)</td>
<td>(0.9095)</td>
<td>(3.1316)</td>
<td></td>
</tr>
<tr>
<td>TRANTRIP</td>
<td>PRKSUP</td>
<td>0.0037</td>
<td>35.5997</td>
<td>0.0728</td>
<td>20.8468</td>
<td>0.716</td>
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<tr>
<td></td>
<td>(2.8530)</td>
<td>(0.9828)</td>
<td>(0.9095)</td>
<td>(2.5131)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRANTRIP</td>
<td>PRKRATE</td>
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<td>0.0728</td>
<td>23.6607</td>
<td>0.708</td>
</tr>
<tr>
<td></td>
<td>(4.2052)</td>
<td>(1.0769)</td>
<td>(0.9095)</td>
<td>(3.0833)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TRANTRIP 1990 Unlinked Transit Trips per Capita.
POPDEN Population Density: 1990 Persons per Square Mile within the City.
EMPCON Employment Concentration: Percent of Metro Area Employment within the CBD.
PRKSUP Parking Supply: Downtown Parking Spaces per Employee.
PRKRATE Parking Rate: Average Unsubsidized Monthly Parking Rate.
RAIL Rail vs. Non-Rail: Dummy Variable for Rail Cities.

Note: T-values in parentheses.

### Large Cities

<table>
<thead>
<tr>
<th>Rank</th>
<th>City</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Atlanta</td>
<td>4.34</td>
</tr>
<tr>
<td>2</td>
<td>Baltimore</td>
<td>3.89</td>
</tr>
<tr>
<td>3</td>
<td>Baton Rouge</td>
<td>3.37</td>
</tr>
<tr>
<td>4</td>
<td>Boston</td>
<td>3.11</td>
</tr>
<tr>
<td>5</td>
<td>Bradenton</td>
<td>2.34</td>
</tr>
<tr>
<td>6</td>
<td>Burlington, VT</td>
<td>1.97</td>
</tr>
<tr>
<td>7</td>
<td>Chicago</td>
<td>1.82</td>
</tr>
<tr>
<td>8</td>
<td>Cleveland</td>
<td>1.59</td>
</tr>
<tr>
<td>9</td>
<td>Dallas</td>
<td>1.50</td>
</tr>
<tr>
<td>10</td>
<td>Daytona Beach</td>
<td>1.43</td>
</tr>
<tr>
<td>11</td>
<td>Denver</td>
<td>1.42</td>
</tr>
<tr>
<td>12</td>
<td>Des Moines</td>
<td>1.41</td>
</tr>
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<td>Detroit</td>
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</tr>
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### Medium Cities

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<th>Population</th>
</tr>
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<td>14</td>
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</tr>
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<td>15</td>
<td>Evansville, IN</td>
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</tr>
<tr>
<td>16</td>
<td>Ft. Lauderdale</td>
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<tr>
<td>17</td>
<td>Ft. Myers</td>
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</tr>
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<td>Gainesville</td>
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<td>19</td>
<td>Hartford, CT</td>
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<tr>
<td>20</td>
<td>Houston</td>
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<tr>
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<td>Huntsville, AL</td>
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<tr>
<td>22</td>
<td>Jacksonville</td>
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<tr>
<td>23</td>
<td>Knoxville, TN</td>
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<tr>
<td>24</td>
<td>Lakeland</td>
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</tr>
<tr>
<td>25</td>
<td>Madison, WI</td>
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</tr>
<tr>
<td>26</td>
<td>Melbourne</td>
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</table>

### Small Cities

<table>
<thead>
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<th>Rank</th>
<th>City</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>Miami</td>
<td>0.46</td>
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<tr>
<td>28</td>
<td>Milwaukee</td>
<td>0.45</td>
</tr>
<tr>
<td>29</td>
<td>New Haven, CT</td>
<td>0.44</td>
</tr>
<tr>
<td>30</td>
<td>New Orleans</td>
<td>0.44</td>
</tr>
<tr>
<td>31</td>
<td>Omaha</td>
<td>0.43</td>
</tr>
<tr>
<td>32</td>
<td>Orlando</td>
<td>0.43</td>
</tr>
<tr>
<td>33</td>
<td>Pensacola</td>
<td>0.42</td>
</tr>
<tr>
<td>34</td>
<td>Philadelphia</td>
<td>0.41</td>
</tr>
<tr>
<td>35</td>
<td>Phoenix</td>
<td>0.41</td>
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<tr>
<td>36</td>
<td>Pittsburgh</td>
<td>0.40</td>
</tr>
<tr>
<td>37</td>
<td>Portland, OR</td>
<td>0.40</td>
</tr>
<tr>
<td>38</td>
<td>Reno, NV</td>
<td>0.39</td>
</tr>
<tr>
<td>39</td>
<td>Richmond, VA</td>
<td>0.39</td>
</tr>
<tr>
<td>40</td>
<td>San Antonio</td>
<td>0.39</td>
</tr>
<tr>
<td>41</td>
<td>San Diego</td>
<td>0.38</td>
</tr>
<tr>
<td>42</td>
<td>San Francisco</td>
<td>0.38</td>
</tr>
<tr>
<td>43</td>
<td>San Jose</td>
<td>0.37</td>
</tr>
<tr>
<td>44</td>
<td>Sarasota</td>
<td>0.36</td>
</tr>
<tr>
<td>45</td>
<td>Savannah</td>
<td>0.36</td>
</tr>
<tr>
<td>46</td>
<td>Seattle</td>
<td>0.35</td>
</tr>
<tr>
<td>47</td>
<td>St. Louis</td>
<td>0.35</td>
</tr>
<tr>
<td>48</td>
<td>St. Petersburg</td>
<td>0.34</td>
</tr>
<tr>
<td>49</td>
<td>Tallahassee</td>
<td>0.34</td>
</tr>
<tr>
<td>50</td>
<td>Tampa</td>
<td>0.34</td>
</tr>
<tr>
<td>51</td>
<td>Washington, DC</td>
<td>0.33</td>
</tr>
<tr>
<td>52</td>
<td>W. Palm Beach</td>
<td>0.33</td>
</tr>
</tbody>
</table>
FIGURE 4. 1990 Unlinked Transit Trips.

<table>
<thead>
<tr>
<th>Large Cities</th>
<th>Medium Cities</th>
<th>Small Cities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Atlanta</td>
<td>14 - Eugene, OR</td>
<td>27 - Miami</td>
</tr>
<tr>
<td>2 - Baltimore</td>
<td>15 - Evansville, IN</td>
<td>28 - Milwaukee</td>
</tr>
<tr>
<td>3 - Baton Rouge</td>
<td>16 - Ft. Lauderdale</td>
<td>29 - New Haven, CT</td>
</tr>
<tr>
<td>4 - Boston</td>
<td>17 - Ft. Myers</td>
<td>30 - New Orleans</td>
</tr>
<tr>
<td>5 - Bradenton</td>
<td>18 - Gainesville</td>
<td>31 - Omaha</td>
</tr>
<tr>
<td>6 - Burlington, VT</td>
<td>19 - Hartford, CT</td>
<td>32 - Orlando</td>
</tr>
<tr>
<td>7 - Chicago</td>
<td>20 - Houston</td>
<td>33 - Pensacola</td>
</tr>
<tr>
<td>8 - Cleveland</td>
<td>21 - Huntsville, AL</td>
<td>34 - Philadelphia</td>
</tr>
<tr>
<td>9 - Dallas</td>
<td>22 - Jacksonville</td>
<td>35 - Phoenix</td>
</tr>
<tr>
<td>10 - Daytona Beach</td>
<td>23 - Knoxville, TN</td>
<td>36 - Pittsburgh</td>
</tr>
<tr>
<td>11 - Denver</td>
<td>24 - Lakeland</td>
<td>37 - Portland, OR</td>
</tr>
<tr>
<td>12 - Des Moines</td>
<td>25 - Madison, WI</td>
<td>38 - Reno, NV</td>
</tr>
<tr>
<td>13 - Detroit</td>
<td>26 - Melbourne</td>
<td>39 - Richmond, VA</td>
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<tr>
<td>14 - Eugene, OR</td>
<td>27 - Miami</td>
<td>40 - San Antonio</td>
</tr>
<tr>
<td>15 - Evansville, IN</td>
<td>28 - Milwaukee</td>
<td>41 - San Diego</td>
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<tr>
<td>16 - Ft. Lauderdale</td>
<td>29 - New Haven, CT</td>
<td>42 - San Francisco</td>
</tr>
<tr>
<td>17 - Ft. Myers</td>
<td>30 - New Orleans</td>
<td>43 - San Jose</td>
</tr>
<tr>
<td>18 - Gainesville</td>
<td>31 - Omaha</td>
<td>44 - Sarasota</td>
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<td>19 - Hartford, CT</td>
<td>32 - Orlando</td>
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<tr>
<td>20 - Houston</td>
<td>33 - Pensacola</td>
<td>46 - Seattle</td>
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<tr>
<td>21 - Huntsville, AL</td>
<td>34 - Philadelphia</td>
<td>47 - St. Louis</td>
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<tr>
<td>22 - Jacksonville</td>
<td>35 - Phoenix</td>
<td>48 - St. Petersburg</td>
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<tr>
<td>23 - Knoxville, TN</td>
<td>36 - Pittsburgh</td>
<td>49 - Tallahassee</td>
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<td>24 - Lakeland</td>
<td>37 - Portland, OR</td>
<td>50 - Tampa</td>
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<tr>
<td>25 - Madison, WI</td>
<td>38 - Reno, NV</td>
<td>51 - Washington, DC</td>
</tr>
<tr>
<td>26 - Melbourne</td>
<td>39 - Richmond, VA</td>
<td>52 - W. Palm Beach</td>
</tr>
</tbody>
</table>
FIGURE 5. CBD Employment.

(Note: Because data are not available, cities 3, 5, 6, 14, 18, 26, 29, 39, and 49 are not shown.)
FIGURE 6. CBD Parking Supply.

NOTE: Because data are not available, cities 3, 14, 18, 26, 31, 33, 34, 35, 38, 39, 44, 45, 48, and 49 are not shown.
FIGURE 7. Persons per Square Mile Within City Limits.
FIGURE 8. Percent of Metropolitan Area Employment in CBD.

NOTE: Because data are not available, cities 3, 5, 6, 14, 18, 29, 39, and 49 are not shown.
FIGURE 9. Downtown Parking Spaces per Employee.

NOTE: Because data are not available, cities 3, 5, 6, 14, 18, 26, 29, 31, 33, 34, 35, 38, 39, 44, 45, 48, and 49 are not shown.
FIGURE 10. Average Monthly Unsubsidized Parking Rates.

2. Baltimore 15 - Evansville, IN 28 - Milwaukee 41 - San Diego
3. Baton Rouge 16 - Ft. Lauderdale 29 - New Haven, CT 42 - San Francisco
4. Boston 17 - Ft. Myers 30 - New Orleans 43 - San Jose
5 - Bradenton 18 - Gainesville 31 - Omaha 44 - Sarasota
6 - Burlington, VT 19 - Hartford, CT 32 - Orlando 45 - Savannah
7 - Chicago 20 - Houston 33 - Pensacola 46 - Seattle
8 - Cleveland 21 - Huntsville, AL 34 - Philadelphia 47 - St. Louis
9 - Dallas 22 - Jacksonville 35 - Phoenix 48 - St. Petersburg
10 - Daytona Beach 23 - Knoxville, TN 36 - Pittsburgh 49 - Tallahassee
11 - Denver 24 - Lakeland 37 - Portland, OR 50 - Tampa
12 - Des Moines 25 - Madison, WI 38 - Reno, NV 51 - Washington, DC
13 - Detroit 26 - Melbourne 39 - Richmond, VA 52 - W. Palm Beach

NOTE: Because data are not available, cities 3, 13, 14, 20, 26, 31, 33, 34, 35, 38, 39, 44, and 49 are not shown.
FIGURE 11. 1990 Transit Trips per Capita.

Large Cities | Medium Cities | Small Cities
---|---|---
1 - Atlanta | 14 - Eugene, OR | 27 - Miami
2 - Baltimore | 15 - Evansville, IN | 28 - Milwaukee
3 - Baton Rouge | 16 - Ft. Lauderdale | 29 - New Haven, CT
4 - Boston | 17 - Ft. Myers | 30 - New Orleans
5 - Bradenton | 18 - Gainesville | 31 - Omaha
6 - Burlington, VT | 19 - Hartford, CT | 32 - Orlando
7 - Chicago | 20 - Houston | 33 - Pensacola
8 - Cleveland | 21 - Huntsville, AL | 34 - Philadelphia
9 - Dallas | 22 - Jacksonville | 35 - Phoenix
10 - Daytona Beach | 23 - Knoxville, TN | 36 - Pittsburgh
11 - Denver | 24 - Lakeland | 37 - Portland, OR
12 - Des Moines | 25 - Madison, WI | 38 - Reno, NV
13 - Detroit | 26 - Melbourne | 39 - Richmond, VA
40 - San Antonio
41 - San Diego
42 - San Francisco
43 - San Jose
44 - Sarasota
45 - Savannah
46 - Seattle
47 - St. Louis
48 - St. Petersburg
49 - Tallahassee
50 - Tampa
51 - Washington, DC
52 - W. Palm Beach
FIGURE 12. Transit Trips per Capita Versus Persons per Square Mile Within City Limits.

1 - Atlanta
2 - Baltimore
3 - Baton Rouge
4 - Boston
5 - Bradenton
6 - Burlington, VT
7 - Chicago
8 - Cleveland
9 - Dallas
10 - Daytona Beach
11 - Denver
12 - Des Moines
13 - Detroit
14 - Eugene, OR
15 - Evansville, IN
16 - Ft. Lauderdale
17 - Ft. Myers
18 - Gainesville
19 - Hartford, CT
20 - Houston
21 - Huntsville, AL
22 - Jacksonville
23 - Knoxville, TN
24 - Lakeland
25 - Madison, WI
26 - Melbourne

27 - Miami
28 - Milwaukee
29 - New Haven, CT
30 - New Orleans
31 - Omaha
32 - Orlando
33 - Pensacola
34 - Philadelphia
35 - Phoenix
36 - Pittsburgh
37 - Portland, OR
38 - Reno, NV
39 - Richmond, VA
40 - San Antonio
41 - San Diego
42 - San Francisco
43 - San Jose
44 - Sarasota
45 - Savannah
46 - Seattle
47 - St. Louis
48 - St. Petersburg
49 - Tallahassee
50 - Tampa
51 - Washington, DC
52 - W. Palm Beach
FIGURE 13. Transit Trips per Capita Versus Percent of Metropolitan Area Employment in CBD.

NOTE: Because data are not available, cities 3, 5, 6, 14, 18, 26, 29, 39, and 49 are not shown.
FIGURE 14. Transit Trips per Capita Versus Downtown Parking Spaces per Employee.

NOTE: Because data are not available, cities 3, 5, 6, 14, 18, 26, 29, 31, 33, 34, 35, 38, 39, 44, 45, 48, and 49 are not shown.
FIGURE 15. Transit Trips per Capita Versus Average Monthly Unsubsidized Parking Rates.

NOTE: Because data are not available, cities 3, 13, 14, 20, 26, 31, 33, 34, 35, 38, 39, 44, and 49 are not shown.
REVIEW OF NATIONAL PARKING EXPERIENCES

This section of the report contains a discussion of parking management programs and parking/transit coordination efforts in other states. Technical Memorandum No. 1 presented results of a literature review of parking and transit policy coordination. That review revealed little current literature involving the coordination of parking and transit policies, but revealed a great deal of literature on parking management measures. The types of parking management measures can be grouped into four broad areas:

- supply-side measures;
- demand-side measures;
- enforcement measures; and
- transportation demand management (TDM) initiatives.

TDM often includes parking-related measures that can be grouped into one or more of the first three areas. Because TDM initiatives generally represent a more active and aggressive approach by cities, it is separately identified.

Subsequent to the literature review, 20 cities were identified as being particularly innovative or aggressive in managing downtown parking. These cities were contacted directly in order to obtain more information about their efforts to coordinate transit policies and parking management programs. The cities were surveyed about parking and transit coordination efforts in three specific areas:

- the impacts on transit ridership that resulted from implementing parking policies or measures;
- the key factors of the policies or measures that increased use of transit; and
- implementation issues.

These surveys yielded little information beyond what was found in the literature review. In general, local officials had little specific information regarding coordination efforts or processes, and only anecdotal information on impacts, characteristics, and implementation issues. However, the discussions led to a greater understanding of the unique conditions that led to the implementation of each city’s parking policies and measures.
There are several reasons why cities implement parking measures and programs, such as to comply with Clean Air Act requirements, to generate revenue, to restrict parking for specific uses (e.g., residential parking, and carpools and vanpools), to manage congestion, and to increase transit usage. In the majority of the cities contacted, officials indicated that they have not recently implemented parking measures, primarily because of the impact that the economic recession has had on local business activity. Because of the recession new development activity has slowed or ceased. Many existing businesses have restricted or postponed expansion plans, and others have relocated to suburban locations to save costs or have gone out-of-business. Most cities now have an over supply of parking for the level of commercial and retail activity occurring in their downtown areas; which is a condition not conducive for reducing automobile trips and increasing transit usage. Further, most cities are reluctant today to place constraints on parking given the sensitivity of the development community to such constraints.

The parking management measures and, if known, parking and transit policy coordination efforts, are described below for 20 cities. A consistent format of describing the measures and coordination efforts in each city is attempted. However, due to the inconsistency in the quantity and quality of information obtained from the interviews, some cities have broader and more detailed descriptions than others. To facilitate comparison of the cities, Table 3 summarizes the parking management measures implemented in each city. It should be noted that this is not an exhaustive list of measures; it includes only measures considered to have some impact on transit.

Baltimore, Maryland

According to city officials, there have not been specific efforts to coordinate parking and transit policies, though they recognize the importance of doing so. These officials believe, however, that with increased political emphasis on air quality, the city and the local transit operator, Mass Transit Administration of Maryland (MTA), will begin to coordinate activities and policies.

The city is currently implementing trip reduction programs in the downtown among businesses with over 100 employees. Baltimore is classified as a severe nonattainment area for ozone and a moderate nonattainment area for carbon monoxide, and meeting the Clean Air Act provisions is one of the primary concerns of the city. These programs include preferential parking for high occupancy vehicles (HOVs), government assistance in forming carpools and vanpools, and employer subsidized transit passes.
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TABLE 3. (Continued).

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The city has also implemented parking management measures to encourage retail activity, to reduce congestion in the downtown and on major access routes, and to raise revenue. In several satellite business areas of the city, long-term spaces were converted to short-term spaces to discourage long-term parkers from using spaces that local businesses wanted to reserve for patrons. The program has not been successful because of inadequate enforcement. There are also several fringe parking lots around the periphery of the CBD and the MTA operates several park-and-ride lots along major travel corridors. Officials believe both programs are successful. The city’s parking tax was implemented to raise additional revenue. Because the tax is a flat fee, it discourages short-term parking. The city is considering changing the tax from a flat fee to a percentage of the total parking fee.

**Bellevue, Washington**

The city of Bellevue, which is located north of Seattle, is a model city regarding the coordination of parking and transit policies. City officials indicate that parking and transit/rideshare policies are always coordinated. Over the past twelve years, the city has implemented several parking- and transit-related programs in order to increase transit ridership. These measures include reduced minimum and flexible parking requirements, preferential parking for HOVs, preferential parking rates for HOVs, residential parking program, and subsidized transit passes.

The city’s earliest efforts to increase transit ridership through parking policies involved reducing the minimum number of parking spaces required in developments and offering a flexible minimum option to developers. The flexible minimum option permitted developers to reduce the number of parking spaces beyond the established minimum if they promoted carpooling and transit usage. However, because many developers failed to meet the obligations of the agreement, the city discontinued the option and has since enacted a trip reduction ordinance (TRO). The ordinance was adopted to increase the proportion of ridesharing and transit commute trips to 18 percent of the total trips into the CBD. The TRO applies to developments in the CBD with 150 employees or more. A transit and vanpool fare subsidy program has also been implemented by the city.
Boston, Massachusetts

The city of Boston has implemented several parking management measures that address environmental, economic, and congestion issues. These measures include a parking freeze, promotion of short-term parking to enhance retail activity, subsidized transit passes, and an aggressive enforcement program.

In 1976, the city implemented a freeze on the development of commercial parking spaces (i.e., public parking spaces for which a fee is paid) in an effort to comply with the Clean Air Act. According to local officials, since the ban did not apply to private spaces, it actually encouraged the development of private parking. To manage the growth of private parking, the city now requires development proposals that include private parking to be reviewed and approved by the Boston Air Pollution Control Commission.

In addition to environmental goals, Boston is also trying to encourage economic activity in retail/commercial areas. In these areas, many short-term metered spaces are not accessible until 9:30 a.m., thus reducing their use by commuters. The city’s aggressive enforcement policy is an important component of its parking management programs.

The city is also making efforts to change commuting habits through a commuter mobility program. A cooperative effort between the city’s transportation department and major employers, the program seeks to develop strategies to reduce single occupancy automobile work trips.

The transportation department influences parking policies through its planning activities and through the permitting process. Occasionally, the department works with the transit operator, the Massachusetts Bay Transportation Authority (MBTA), on various parking- and transit-related issues, such as commuter station parking. City officials indicate, however, that coordination between parking and transit is more likely to be initiated by Boston’s two TMAs, rather than by the city or the MBTA.

Overall, officials believe the city’s parking management measures are a success. However, the impacts of these measures upon transit usage or carpooling have not been analyzed.

Burlington, Vermont

Burlington is a small city of approximately 40,000 people. Recently, the city has become involved in several parking and transit-related programs. These programs include promoting ridesharing and transit use, and operating a shuttle service connecting fringe parking lots with the
downtown. The state also operates park-and-ride lots along major travel corridors. City officials indicate that these programs have been successful.

The city has also recently passed a TDM ordinance that provides developers with alternatives to meeting minimum parking requirements. A parking mass capital fund also was created in which developers can make cash contributions in exchange for reduced parking requirements.

Officials indicate that Burlington does not currently have a parking problem, and that the impacts of the city’s parking programs have not been analyzed.

Chicago, Illinois

Chicago is the largest city examined in this study and, compared with most of the other cities studied, has a rather long history in parking management. Historically, parking measures for Chicago have been implemented to manage traffic congestion, control parking supply, and to meet guidelines for air quality. The parking management measures currently in place include:

• a ban on parking in the CBD core;
• restriction of principal use parking facilities;
• reduced minimum and flexible parking requirements in lieu of support for HOVs and transit;
• zoning incentives to reduce parking;
• fringe parking;
• park-and-ride;
• parking rates which favor short-term parking;
• employer subsidized transit passes; and
• aggressive ticketing

The city’s role in the elimination of parking spaces for off-street facilities is in the approval process. For on-street parking, the city has placed a ban on all spaces in the downtown core, this was in response to a recent flood in April 1992. The ban is in operation from 6:00 a.m. to 6:00 p.m. and affects 1,200 on-street spaces. The effect of this ban has been minimal due to the small number of on-street spaces.

Development within the core has become more dense over the past two decades in part because of the large amount of fringe parking. The city is concerned, however, that its parking supply is decreasing as a result of new developments replacing CBD core and fringe parking lots.
The city recognizes that maintaining a reasonable parking supply is necessary to accommodate the needs of certain downtown users such as, those who need the automobile due to poor transit accessibility, visitors, shoppers, and VIPs.

In recent years the city has been selling many of the publicly owned parking facilities. According to local officials the city is virtually out of the parking business, with only one or two parking facilities still under public control.

Air quality is also an important concern of the city. In 1972, the city began to actively discourage parking in the downtown area in an effort to improve air quality. (Chicago is classified as a nonattainment, severe area for ozone.) There has been some disagreement however, whether reductions in parking actually help to improve the air. It has been reported by such organizations as the National Academy of Sciences that efforts to reduce the parking supply can have the actual effect of worsening air quality because automobiles are forced to run longer on the streets, producing more emissions as they look for parking. Also, since 1972 improved emission controls have significantly reduced vehicular emissions. It is recognized that in order for there to be a significant improvement of air quality within the Chicago region, emissions from all sources will have to be reduced.

The Chicago region has two major public transit providers into the downtown. The Chicago Transit Authority (CTA) serves the city and the surrounding neighborhoods by motor bus and rail. The Chicago RTA Regional Commuter Railroad Corporation (Metra) is a commuter rail system that provides service to the city from the outlying suburbs. City officials indicate that 75 percent of trips taken into the CBD are on transit and 25 percent are taken by automobile. CTA is part of an interagency coordination effort in such matters as the approval of the construction of parking garages. The city recognizes that if transit becomes a more attractive alternative to automobile use, more people will be encouraged to commute downtown more often. Thus, the city encourages and supports efforts to improve transit.

Dallas, Texas

Due to low density development patterns in Dallas, the city does not have a significant parking problem, and therefore, has no significant parking constraints. However, there are localized parking problems found in small pockets of the downtown, generally near hospitals, and other high traffic generators. The city does, however, promote TDM. For example, the city will reduce minimum parking requirements for developers if they promote TDM and transit use. The
city has also adopted a special parking program in the downtown area which allows the joint use of parking facilities. The program is aimed at owners of older buildings who have submitted rehabilitation plans to the city. If the building does not meet the current minimum parking requirements, the city will approve the rehabilitation plans if the owner enters into a joint use agreement with another nearby building that exceeds the minimum number of required spaces.

Public transit in the city is provided by the Dallas Area Rapid Transit (DART). DART operates a successful transit fare subsidy program begun in 1977, which now has 258 participating businesses. Since 1988, DART has also provided rideshare matching services.

Denver, Colorado

The Parking Management Department is the agency responsible for developing parking policies and programs, and managing on- and off-street parking for the city of Denver. Department officials indicate they occasionally interface with the Regional Transportation District (RTD) on parking issues related to transit.

One example of coordination between the city and the RTD involved a joint effort to reduce the number of proposed parking spaces at a new baseball park. The city and the RTD successfully argued that the requested number of spaces would lower parking costs in the area and reduce incentives to use public transit.

The city currently has two parking management measures in place, an employer subsidized transit pass program, and park-and-ride. The subsidized transit pass program, which is managed by the RTD, is considered to be highly successful according to local officials. Nine different price categories are available under the pass program, depending upon the number of full-time employees in the company and the level of bus service available to the company’s location. Enrolled employees have unlimited rides and are also guaranteed a ride home at no cost in case of emergency. The program began in September 1991 and has nearly 400 companies under contract and over 19,000 registered employees. Recent ridership counts indicate that ridership has increased 4 percent in the district and 40 percent in the city of Denver; much of the ridership increase is attributable to the transit pass program.

There are two important factors in place in Denver which encourage future coordination of parking and transit policies. The first is an established communication link between the city and the RTD. Both parties have demonstrated a willingness and ability to address transportation issues that involve parking and transit. The second factor is a recognition among city officials
of the need to develop parking policies that support public transit. There are three areas of future coordination efforts that have been cited by local officials: slowing the rate of parking lot development, implementing parking rates that discourage long-term and encourage short-term parking, and providing more incentives for carpooling and transit usage.

**Des Moines, Iowa**

The public transit provider, Des Moines Metropolitan Transit Authority (MTA) has implemented an employer provided transit subsidy program. The program, which began in 1974, currently has 55 to 60 major employers enrolled. MTA sells the monthly pass at the regular price to the employer and the employer then decides what amount the subsidy should be. Most employers subsidize half the monthly transit fare of $22.00. The program is considered to be very successful, and is attributable for at least one-third of MTA’s operating revenue.

**Hartford, Connecticut**

The cities major parking management measures were implemented in the CBD between eight and ten years ago primarily to address congestion problems resulting from the economic growth in the 1980’s. The current economic recession, however, has curtailed growth, and congestion is no longer a major problem. There have not been any new development projects in recent years and the building vacancy rates have been rising in the downtown. While air quality is a concern for the city, (Hartford is classified as a serious nonattainment area for ozone and a moderate nonattainment area for carbon dioxide) the city has not used parking management measures as a means to reduce auto emissions. The city’s current parking management measures include:

- conversion of long-term spaces to short-term;
- reduced minimum and/or flexible parking requirements for developers in exchange for support for HOV and transit usage;
- HOV reserved parking;
- fringe parking;
- park-and-ride;
- employer subsidized transit passes; and a
- TMA

Connecticut Transit (CT Transit) operates a shuttle system from fringe parking facilities to the downtown. Greater Hartford Transit also provides a "scooter" service which provides transportation between downtown buildings.
According to city officials, parking is now used primarily as a development incentive. Further, issues involving parking are generally addressed without input from either CT Transit or Greater Hartford Transit.

Houston, Texas

Because of the recession, which has been particularly severe in Texas, the city does not currently have a parking problem. Office vacancy rates are among the highest in the country.

Houston presently has several parking management measures in force, including parking rates that favor carpools and vanpools, employer subsidized transit passes, HOV lanes on the interstates, and park-and-ride. The primary objective of these measures is to reduce congestion on the interstates. City officials indicate that the measures have been successful so far, though they have not quantified the impacts.

Knoxville, Tennessee

The central business district of Knoxville is compact due to physical boundaries imposed by surrounding hills and a river. Because of the scarcity of land and a desire to manage traffic congestion, the city has implemented a fringe parking program. The Knoxville Transit Authority operates a free trolley shuttle service from these facilities to the downtown. The trolley service has not had a significant impact on land use or economic development in the city. According to city officials, Knoxville has considered, but not yet formed, a local parking committee to address parking concerns and to coordinate future parking and transit policies.

Madison, Wisconsin

The city has made an effort to increase transit ridership and economic activity through the implementation of several parking management measures. These measures include the conversion of long-term spaces to short-term, elimination of downtown parking spaces, fringe parking, park-and-ride, increase in parking rates, and a surcharge on parkers arriving during peak hours.

The conversion of long-term parking to short-term and increasing long-term parking rates has increased parking availability for downtown shoppers. The city has also eliminated many on-street spaces in the downtown in an effort to reduce traffic congestion. The city has also instituted a peak period surcharge of $1.00 at several parking facilities. The purpose of the
surcharge is to provide an incentive for persons who drive alone to use transit or join carpools. The surcharge has resulted in a decrease in occupancy levels at these parking facilities during the morning peak periods. The public transit operator, Madison Metro Transit System, operates service from several park-and-ride lots in the area.

**Minneapolis, Minnesota**

The city of Minneapolis has recently constructed a new interstate that has incorporated conveniently located park-and-ride lots and garages, and HOV lanes for transit and HOVs. Parking rates are significantly reduced for carpoolers: $10 per month versus the regular $80 per month for persons who drive alone.

Minneapolis and its sister city, St. Paul, are served by the Metropolitan Transit Commission (MTC). The MTC was involved with the interstate project throughout all phases of the project. City officials believe that the new interstate has increased both the number of persons who carpool and transit usage.

**Montgomery County, Maryland**

Montgomery County is located north of Washington, D.C. Major cities within the county include Silver Spring, Bethesda, and Forest Glen. Public transit is provided by the Washington Metropolitan Area Transit Authority (the Metro) and the Montgomery County Ride-On. The county is responsible for organizing both parking management and transit service provided by Ride-On.

Montgomery County has several parking management measures in force, including preferential/reserved parking for HOVs, parking rates which favor HOVs, and park-and-ride. A TMA has also been formed in the county. The primary goals of these measures are to reduce traffic congestion and to more effectively use the county's available parking supply.

According to local officials, there have been noticeable impacts resulting from its parking measures. For example, there has been a one-third to one-half reduction of parking in developments, which has facilitated the conversion of former parking areas to other land uses. Economic development impacts have been hard to measure due to the current recession.
In 1988, a TMA was formed in Silver Spring and was made part of the Montgomery County Department of Transportation. The principal goal of the TMA is to minimize downtown traffic congestion. Companies registered with the TMA are required to sign a ten-year traffic mitigation contract requiring them to reduce single occupancy vehicle use to no more than 50 percent of their employees (54 percent for Silver Spring). These goals were achieved in 1992. Current TMA programs include discount transit fares, carpooling (preferential rates in public facilities which are two-thirds of regular parking cost), and a matching service for carpoolers.

**New Orleans, Louisiana**

The city of New Orleans has formulated parking management measures to decrease the number of automobiles within the CBD by increasing the utilization of both peripheral parking and public transit. The CBD is small and compact with little room for road capacity improvements. The combination of a large downtown workforce, limited parking and road capacity creates congestion in the area. The city has mandated that CBD developments of 50,000 sq. ft. or more must develop a transportation plan that support HOV and transit use. In addition, the city has CBD fringe parking, which is served by a shuttle bus system operated by the Regional Transit Authority (RTA). Overall, city officials indicate that its parking management measures have been successful in reducing CBD traffic congestion.

**Pittsburgh, Pennsylvania**

Parking management measures for the city of Pittsburgh include a city-wide parking tax and fringe parking. The city is planning to construct parking garages in the CBD periphery and to provide transit service from these facilities to downtown. Proposed interstate improvements include HOV lanes which will be directed into the peripheral garages. The local transit agency, the Port Authority of Allegheny County (PAT), has been involved in the planning of these garages.

**Portland, Oregon**

The city of Portland has a long history of coordinating parking and transit policies. Coordination between the transit agency and the city began before the implementation of the 1975 parking cap. The city felt strongly that downtown workers should have alternatives to driving alone and worked with businesses and the transit agency to guarantee that the travel demands of downtown workers could be met with these alternatives. Almost all parking policies are
discussed by a committee consisting of representatives of the city, transit agency, and the downtown business community. Officials believe that communication between all agencies is important for ensuring the success of the city’s transportation program.

The city’s current parking management program contains measures that support transit and HOV use. The parking measures currently in place include:

- a cap on downtown parking supply;
- promotion of short-term parking;
- restriction of principal use parking facilities;
- maximum and no minimum parking requirements;
- joint-use of parking facilities; no mixed-use of hotel and residential;
- directing high-density developments to main transit corridors;
- preferential parking/reserved parking for HOVs;
- park-and-ride;
- rates which favor short-term parking;
- rates which favor HOVs;
- employer subsidized transit pass; and an
- aggressive enforcement program.

The parking cap was instituted in 1975 as part of Portland’s Downtown Parking and Circulation Policy. The cap was set at 43,000 to 41,000 spaces in the downtown area (residential use and hotels are exempt). Parking supply is also controlled through restricting the construction of principal use parking facilities. The city’s parking code sets a maximum number of parking spaces allowed depending on proximity to transit; there are no minimums, except for residential uses. The code also permits developers to enter into joint parking agreements with other developments that have parking surpluses or whose tenants operate at different hours.

The city supports carpools and vanpools by setting preferential parking rates and reserving parking spaces. The city requires that the parking supply of a facility is limited to no more than actual demand and that 15 percent of total parking spaces are to be reserved for HOVs. An on-street preferential parking program has also been instituted. These spaces are located in the less densely developed portions of the CBD where long-term parking will not disrupt traffic flow or utilize spaces that could be used by patrons of local businesses.

Like many other cities, Portland is concerned about regional air quality. In response to federally mandated clean air requirements, Portland has implemented coordinated transit and parking policies designed to discourage downtown vehicle traffic and promote the use of transit. For example, the city directs high-density development to its main transit corridor.
Officials indicate that the city’s parking management measures have reduced congestion, but have not adversely affected economic development. For instance, downtown employment has increased from 69,800 in 1975 to 90,000 in 1990. During this same timeframe, daily one-way transit ridership increased from 79,000 to 125,000.

These measures have also contributed to improved air quality. Before 1975, the city exceeded carbon dioxide limits at least three times a year. During the past three years, however, the city has not exceeded the limits.

Overall, the parking measures and policies for Portland are considered very successful. The key component to the city’s success is effective communication between the city, the transit agency, and the downtown business community.

San Francisco, California

Like similar west coast cities included in the national review, San Francisco actively coordinates parking and transit policies. Many of its parking management measures were implemented to reduce automobile trips to the downtown by increasing transit usage. These measures include:

* restrictions on principal use parking facilities;
* maximum and no minimum parking requirements;
* reduced minimum/elastic parking requirements for developers in exchange for support of HOVs and transit;
* conversion of long-term spaces to short-term;
* rates that favor short-term parking;
* preferential/reserved parking for HOVs;
* rates that favor HOVs;
* fringe parking;
* park-and-ride;
* parking tax.

The city has established three parking districts in its downtown. The first district is the downtown core; new parking facilities are prohibited and existing parking is being converted to short-term use. Parking rates in this zone are established so that the hourly rate increases with the number of hours parked. The second district contains a belt of short-term parking around the central core of the downtown. The third district contains peripheral parking facilities. Parking rates in the third district are less expensive for long-term commuters. Shuttle buses provide service from these facilities to the CBD.
San Francisco's zoning ordinance places a maximum on parking requirements and flexible parking requirements in certain areas for developers who agree to ridesharing and transit use. The city has also instituted a transit impact fee for new developments. The impact fee is $5.00 per square foot of office space and is used to support transit operations.

The city considers its parking management measures to be successful. For example, the city experienced heavy and rapid developmental growth between 1977 and 1985. However, the number of parking spaces increased by only 1,200 spaces and the traffic volume on the major arterials did not increase greatly. The number of single occupancy vehicles entering the downtown has greatly decreased during this time period and currently account for only 12 percent of the CBD's work trips. This accomplishment is attributed in part to the success of the regional rail system, Bay Area Regional Transit (BART), and the San Francisco Municipal Railway (Muni)

Seattle, Washington

The city of Seattle also coordinates parking and transit policies. The city has implemented a comprehensive set of parking management measures in order to comply with the state's growth management laws and to make people less dependent on single occupancy automobile use. Seattle's parking management program consists of the following measures:

- maximum and no minimum parking requirements
- reduced minimum and/or flexible parking requirements that support HOV and transit
- carpool/vanpool preferential parking
- preferential rates for short-term parking
- preferential rates for carpools/vanpools
- subsidized employee transit pass
- park-and-ride

Seattle's zoning code contains no minimum parking requirements in certain areas but specifies parking maximums depending on the type of land use. In other areas, the code specifies other minimum and maximum requirements based on a development's proximity to transit stops, the number of carpool spaces provided, and whether or not employee transit subsidies are provided.

According to local officials, carpools and vanpools have been very successful in Seattle. Carpools and vanpools are given preferential treatment in terms of pricing and location. There
is currently a waiting list for carpool spaces in city operated lots. The city is reluctant to dedicate more spaces to HOV use because the action may reduce spaces that would be available for shoppers.

**Washington, D.C.**

Washington, D.C. has a unique parking situation due to its large federal government employment base. The federal government is the single largest employer in the Washington metropolitan area with 362,000 employees, or 16.7 percent of the area's total workforce. According to a study performed by the Washington Metropolitan Council of Governments, 74 percent of the vehicles parked at federal facilities park for free, and only 4 percent pay the full market rate. Of those vehicles parked at non-federal facilities in the CBD, the study found that 30 percent park for free.

With Washington's large downtown workforce of nearly 700,000 persons and a downtown parking supply of approximately 311,000 spaces, parking management is a serious concern for the city. The city and the transit operator, the Washington Metropolitan Area Transit Authority (the Metro) have a long history of coordinating parking and transit policies. The parking management measures which are currently in force in the city include: reserved parking for HOVs, fringe lots, park-and-ride, parking tax, residential parking program, and an aggressive enforcement program.

Many federal parking facilities promote HOV use by reserving spaces for HOVs. This measure has been successful in downtown Washington, resulting in a high rate of carpooling and vanpooling.

There are several park-and-ride lots in the metropolitan area. Several of the lots are free and are served by bus, while other Metro lots serve the park-and-ride lots by Metrorail. The Metrorail lots are highly utilized.

The parking tax instituted in the city is based on a percentage of the total fee rather than a flat fee that is common among other cities reviewed in this report.

The city also has an aggressive parking enforcement program which is an important factor contributing to the success of the city's parking management program. The results of the enforcement program have been very positive; illegal parking has been greatly reduced, metered parking turnover has increased, congestion in the CBD has been reduced, and bus travel times have improved.
REVIEW OF PARKING EXPERIENCES IN THE SELECTED FLORIDA CITIES

This section of the report presents an evaluation of parking and transit policy coordination efforts in the four selected Florida cities. Also presented are an evaluation of transit and parking costs, data from transit on-board surveys, and parking cost coefficients used in Florida urban area mode split models.

Transit Cost versus Parking Cost

Research has shown that parking cost is a factor that affects mode choice. The significance of this factor in determining mode choice is directly related to the availability, cost and quality of other modes. For example, if persons have what they determine to be acceptable transportation alternatives, they are more likely to change modes or commuting habits (e.g., they may carpool) as the price of parking increases beyond acceptable limits. If there are no acceptable alternatives, parking cost increases will have little effect on mode choice. (Ultimately, however, persons may choose to find employment in locations where parking costs are more reasonable.)

Parking and transit costs were examined for the four selected Florida cities. Table 4 presents unsubsidized monthly parking rates, the estimated percentage of downtown employees who park for free, and the cost of a monthly transit pass. Of the four cities, the downtown areas of Miami and Orlando have the highest unsubsidized monthly parking rates. In Ft. Myers unsubsidized parking rates are less than the cost of a monthly transit pass. In certain fringe areas of Miami, the monthly parking rates are less than the cost of a monthly transit pass. One of the most significant findings of the research conducted for this study is the percentage of parkers who have their parking costs subsidized by an employer. In Orlando, a survey conducted by the Downtown Orlando TMA found that 75 percent of the employers responding to the survey provided free parking for their employees and that 81 percent of the downtown employees who drive, park for free. A 1987 study in Miami found that 50 percent of the employees that park downtown receive parking subsidies from their employers. In Ft. Myers, 71 percent of the parking spaces downtown are unmetered county, city, and private spaces, which are generally provided free to employees. Although there are no statistics available for Ft. Lauderdale, a significant number of the parking spaces in the downtown are located in private facilities, where parking is often provided free by employers.

Employer subsidized parking is an important fringe benefit provided by employers. It is also one of the biggest barriers faced by a city seeking to improve transit usage and ridesharing.
TABLE 4. Transit Pass and Parking Rates.

<table>
<thead>
<tr>
<th>City</th>
<th>Unsubsidized Monthly Transit Pass</th>
<th>Unsubsidized Monthly Parking Rates</th>
<th>% DT Auto Commuters Who Park for Free</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miami</td>
<td>$60</td>
<td>$50-80 CBD East $25-40 CBD West</td>
<td>50%</td>
</tr>
<tr>
<td>Ft. Lauderdale</td>
<td>$30</td>
<td>$45</td>
<td>n/a</td>
</tr>
<tr>
<td>Orlando</td>
<td>$30</td>
<td>$75 - DT $35 - Fringe</td>
<td>81%</td>
</tr>
<tr>
<td>Ft. Myers</td>
<td>$25</td>
<td>$9</td>
<td>71%</td>
</tr>
</tbody>
</table>

K.T. Analytics, Inc. "Dade County Parking/Transit Ridership Study." Frederick, MD: K.T.
Analytics, Inc. (January 1987).
Telephone surveys and interviews with transit authorities and parking divisions.

To address this problem many cities are promoting transportation allowances—cash payments that employers give to employees to purchase transit passes or pay for ridesharing costs. These payments are made in lieu of parking subsidies that employers provide to their employees.

Transit On-Board Surveys/Other Surveys

Transit agencies occasionally conduct on-board passenger surveys to obtain information to help in service planning. These surveys sometimes include questions regarding parking-related motivations for using transit.

Of the four Florida cities, Ft. Myers (LeeTran) has conducted the most recent (1989) on-board survey. However, there were no parking-related questions on the survey. Ft. Lauderdale (Broward county Transit) and Orlando (Lynx) have not conducted on-board surveys in the past six years.

In 1988, Metro-Dade Transit conducted a tracking study of transit usage patterns, which is similar to an on-board survey. The survey found that of the motivations for using the bus system: 56 percent of the surveyed passengers indicated they did not have a car or an operational vehicle; 16 percent said they did not drive or had no license; 7 percent indicated they use transit to avoid congestion or that it was faster; and 4 percent said that parking was inconvenient. Of the rail passengers surveyed, 45 percent said they used rail to avoid congestion or that it was faster; and 25 percent said it was economical (i.e., they could save on gas and parking).
Metro-Dade Transit also conducted a rider retention and service performance evaluation in 1989. The purpose of the survey was to obtain passenger opinions on service attributes and recently implemented service enhancements. Eight percent of the respondents said that an increase in Metrorail station parking was responsible for them initiating rail use, and 23 percent indicated that increased station parking was responsible for them increasing rail use. In another question, passengers were asked what service attributes were most likely to cause them to decrease their rail use. Among the responses involving parking, 27 percent of the respondents said safety in station parking lot was a factor that would decrease rail use; 24 percent said station parking lot payment procedure; 16 percent said availability of station parking; and 7 percent said accessibility of station parking lots. These survey findings indicate the importance of the design and operation of park-and-ride facilities in attracting and maintaining transit users.

Although an on-board survey has not been conducted recently in Orlando, the Downtown Orlando TMA conducted an employer and employee survey in 1991 to obtain information on commuter attitudes toward parking, traffic, and commuting alternatives. As mentioned earlier, the survey found that 75 percent of responding employers provide free parking for all employees, while only seven percent make no provisions for any employee parking. The survey also found that 86 percent of downtown employees drive alone to work at least four days per week, and only one percent ride the bus or walk to work on a regular basis.

Parking and the Travel Demand Modeling Process

An evaluation was made of the mode split modules contained in the state’s travel demand models to determine whether the coefficients on parking cost accurately reflect actual parking rates in the four urban areas.

Local governments and metropolitan planning organizations develop transportation improvement programs and long-range transportation plans based on projections of travel patterns and volumes in the region. The Florida Standard Urban Transportation Modeling System (FSUTMS), tailored to each urban area, is the basic travel demand modeling software used in the state. The models contain several modules, such as trip generation, distribution, assignment, and mode split.

FSUTMS can produce both highway and transit network runs. Most of the cities in Florida only produce highway network runs, because transit’s share of the travel market is small. Of the four selected cities, however, Ft. Lauderdale (Broward County) and Miami (Dade County) produce transit runs.
Parking and Transit Policy Coordination Efforts in the Four Florida Cities

Miami

There are no formal agreements in Miami requiring agencies to coordinate parking and transit policies. Coordination occurs, however, because of common goals shared by the city, the Department of Off-Street Parking, Metro-Dade Transit, and the development community.

Because of growth management and air quality concerns, the city has implemented several parking management measures to reduce congestion by increasing transit use and ridesharing. These measures include establishing maximum parking requirements for downtown developments, reducing minimum on-site parking requirements for developers if they provide off-site parking or commit to supporting transit and ridesharing, and park-and-ride. The city is also in the process of forming a TMA.

In 1987, the city conducted a parking/transit ridership study, which recommended several changes in parking policies in order to improve transit ridership and economic development. These recommendations included increasing parking rates for long-term parkers, decreasing rates and reserving spaces for short-term parkers, relaxing parking requirements in areas where parking controls have constrained development, adding parking at two southern Metrorail stations, charging fees for low occupancy vehicles parking at Metrorail stations, and reserving spaces for HOVs at Metrorail stations. Since then the city has increased parking at the Metrorail stations and increased downtown parking rates. The rate increase, however, was implemented to offset rising operating costs rather than to discourage long-term parking. The other recommendations have not yet been implemented.

Orlando

The city of Orlando does not have a formal process for coordinating parking and transit policies. However, all of the principal agencies (i.e., the city planning department, Lynx Transit, the Parking Bureau, and the Downtown Development Board) have established strong lines of communication with each other and continually participate in a process of coordination when considering parking and transit issues. Local officials are keenly aware of the impacts of parking on transit usage and the need to balance those impacts with economic development, air quality, and growth management concerns.
A TMA has been formed in the city to educate employers and employees on commute alternatives. Enrollment in the TMA is not as high as expected because of the economic recession. Local officials are optimistic that the program will significantly influence transit and ridesharing in the city as the economy recovers and participation increases.

Orlando’s principal transit-related parking policy is a flexible parking requirement on new developments in the downtown core. Under this option, developers may reduce the amount of required parking up to 20 percent in exchange for contributing the city’s Parking Program Trust Fund. Revenue from this fund can be used for construction of off-site parking, to fund parking facility operating costs, to provide transit or transit-related services to off-site parking areas, and to conduct parking needs studies. This policy is of marginal benefit to transit. The policy limits the growth in downtown parking by transferring spaces to fringe areas that are served by transit shuttles. This does not eliminate required automobile trips and only marginally reduces vehicle miles traveled.

**Ft. Lauderdale**

Similar to Orlando, there is no formal process for coordinating parking and transit policies in the city. Unlike Orlando, however, there is little communication between the transit authority and the city involving parking issues and policies.

Local officials believe that there has not been a real need to coordinate policies, since transit plays such a minor role in bringing people into downtown. However, the city is concerned about growth management and air quality, and is interested in developing a more pedestrian friendly environment downtown. As a result, the city formed a TMA in November 1992 to promote ridesharing and other commute alternatives.

**Ft. Myers**

There is no significant coordination of parking and transit policies in Ft. Myers. The city has considered forming a TMA to address congestion problems in the downtown. Because of the recession, however, there is not an urgent need to form the organization. The city has one park-and-ride lot, located in a shopping center.

The downtown area is a parking exempt zone, in which minimum parking requirements in new developments are waived. This policy was formed to provide an incentive to developers to implement projects in the downtown. The policy is also supportive of transit since it can limit the supply of parking downtown.
The need for coordination, however, has been expressed by local officials. For example, the local transit agency (LeeTran) expressed concern over the recent construction of county and state office buildings that contain 830 and 400 parking spaces, respectively. Their concern was that the parking plans for these buildings were developed without consulting with LeeTran and determining whether the transit agency could meet any of the accessibility needs of the building.

**CANDIDATE POLICIES AND COORDINATION ACTIVITIES**

This section of the report identifies candidate policies and coordination activities that may have application in Florida. The Florida and national review of parking and transit policy coordination efforts revealed that cities have implemented a wide range of parking management measures. Many cities have adopted similar measures, but with varying results. The success or failure of parking measures depends on many factors that define an area’s travel demand market and affect local mode choices. In other words, parking measures that are effective in one city may not be effective in another.

Coordination activities also vary from city to city. Defining specific coordination activities is difficult because coordination is both a process and a "mind set". Coordination is a process because it requires that certain agencies discuss their plans and activities with other agencies in order to develop actions that benefit both. Coordination is also a "mind set" because the effectiveness of it depends on the spirit in which it is practiced; some individuals and organizations are more active than others in communicating with other individuals and organizations.

The parking supply and price situation in Florida’s cities is a natural result of market forces responding to the transportation needs of a dispersed population. The state has recognized the benefits of concentrating development activity, as evidenced by the growth management legislation of the 1980s. Although the legislation has not been tested fully because of the downturn in economic development, the process is in place to change development patterns as the economy recovers.

The approach for coordinating parking and transit policies in Florida would include the following characteristics: parking measures that balance parking supply controls with gradual changes in development patterns that result from the state’s growth management initiatives, coupled with transit improvements and demand-side parking management measures that encourage developer and employer subsidization of transit rather than parking. Because of the state’s
dispersed development patterns and the sensitivity of the development community to parking controls, it is important not to pursue drastic measures to reduce parking supply or raise parking rates, since transit can not effectively provide an equivalent level of quality and convenient service as the automobile.

The types of policies that may be appropriate for Florida cities include:

Zoning/Land Use policies:
- Adopt maximum parking requirements.
- Adopt no minimum or flexible minimum parking requirements for developers who support transit and HOVs.
- Adopt no minimum or flexible minimum parking requirements for developers who construct off-site parking in park-and-ride facilities and/or provide transit operating subsidies for park-and-ride transit service.
- Construct more park-and-ride facilities.

Demand-related policies
- Encourage employers to provide transit subsidies or transportation allowances in lieu of parking subsidies.

TDM Measures
- Create more TMAs and continue support for existing TMAs.

Improving coordination efforts in Florida involves improving communication among government agencies and between the public and private sectors on issues of parking and transit. This is a key characteristic of cities such as Portland, Seattle, and Bellevue, Washington, which are cities considered to be innovative and progressive in developing parking policies that support transit use. Orlando is an example of a Florida city that has established and maintains strong lines of communication between city agencies, the parking department, the transit agency, and the private sector.

A state-level educational/marketing program on the subject of communication and coordination of parking and transit policies, perhaps, should be considered. The program could be directed to local governments to increase their awareness of the need for, and the benefits of, coordination. The program could present coordination case studies using Portland, Seattle, and Bellevue as models.
**NEXT STEPS**

The third and final technical memorandum for this study will focus on three areas. First, major issues identified in the study, such as employer subsidization of parking costs, the affect of parking constraints on economic development, and the integration of HOVs in a coordinated package of transit and parking policies, will be addressed. Second, the report will describe various parking-related policies that local governments could adopt that would increase transit use and the cost-effectiveness of public investments in transit and parking. Third, the report will include recommended changes in federal, state, and local government policies and programs that would serve to better coordinate transit and parking programs and will include an action plan for implementing recommended changes.
LIST OF REFERENCES


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"Whither Parking in the City Center?" *Transportation Research Record* 957 (1984): 77-79.


Meyer, Michael D., A.M. ASCE, and Mary McShane. "Parking Policy and Downtown Economic Development."


