Residential Building Transportation Performance Monitoring Study
Topline Results Presentation

October 2013
Study Purpose

Goals

- Travel and parking behaviors of Arlington residents in high density residential buildings with TDM services
- Factors that influence travel choices
- Inform the public about the performance of residential site plans relative to County transportation objectives

Objectives

- Convey mode split and vehicle trip generation
- Convey parking regulation and availability
- Convey auto ownership rates
- Compare awareness/attitudes with mode choice and trip generation
- Compare local trip generation to ITE rates and to TIAs
Residential Building Locations

Data Collection methods:
- Voluntary resident survey
- 24 x 7 vehicle trip and parking data
- Field survey
- Property manager interviews

16 residential buildings = 7 apartments, 1 extended-stay hotel, and 8 condos

Legend:
- Metro Stations
- Study Projects
- Street Network
- Quarter Mile Radius from Study Projects
- Census Blocks included in Study Statistics

Source: Planning Research and Analysis Team, Planning Division, Department of Community Planning, Housing & Development, March 2013.
Building Sample Characteristics

- 3,700 occupied dwelling units (96%)
- 4,840 total parking spaces, all types
- 1.04 – 1.55 residential parking spaces per unit (not including visitor/retail spaces)
- Over 38,000 trips counted
- 11 sites within Metrorail corridors, 5 outside
- 3 sites outside the Metrorail corridors offer shuttle to Metro or ongoing transit subsidy
- East Falls Church is considered outside Metrorail corridors for purposes of this study
## Resident Sample Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Sample</th>
<th>County</th>
<th>Sample is…</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tenure &lt;5 years</td>
<td>69%</td>
<td>35%</td>
<td>Newer</td>
</tr>
<tr>
<td>HHs 2-person or fewer</td>
<td>88%</td>
<td>60%</td>
<td>Smaller</td>
</tr>
<tr>
<td>Sex</td>
<td>49% male</td>
<td>similar</td>
<td></td>
</tr>
<tr>
<td>Age &lt; 35 years</td>
<td>47% (71% under 45)</td>
<td>31%</td>
<td>Younger</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td>76% White, 11% Asian, 6% Hispanic</td>
<td>83% White, 6% Asian, 4% Hispanic</td>
<td>Fewer Asian, more Hispanic</td>
</tr>
<tr>
<td>HH Income $80K</td>
<td>77% (65% $100K+)</td>
<td>60%</td>
<td>Wealthier</td>
</tr>
<tr>
<td>Employment</td>
<td>88%</td>
<td>67%</td>
<td>More employed</td>
</tr>
<tr>
<td>Work Location</td>
<td>45% DC/Alexandria 27% Arlington</td>
<td>41% DC/Alexandria 33% Arlington</td>
<td>Fewer work in Arlington, more in DC/Alexandria</td>
</tr>
</tbody>
</table>
Behaviors: Commute Travel Mode Split
Study Residents Drove Alone to Work Less and used Transit More than the Regional Average

Q6 How many weekdays do you typically use each of the following types of transportation to get to work?

<table>
<thead>
<tr>
<th>Mode split - All weekly commute trips</th>
<th>Study Residents</th>
<th>All Arlington residents</th>
<th>Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive-alone</td>
<td>51%</td>
<td>54%</td>
<td>64%</td>
</tr>
<tr>
<td>Transit</td>
<td>34%</td>
<td>27%</td>
<td>21%</td>
</tr>
<tr>
<td>Bike/walk</td>
<td>7%</td>
<td>8%</td>
<td>2%</td>
</tr>
<tr>
<td>TW/CWS</td>
<td>5%</td>
<td>6%</td>
<td>6%</td>
</tr>
<tr>
<td>Drive/ride with others</td>
<td>3%</td>
<td>5%</td>
<td>7%</td>
</tr>
</tbody>
</table>

Sources:
Region and Live in Arlington - 2010 COG SOC Survey
Study Bldgs - Resident Surveys

Region: n = 6,050
Live in Arlington: n = 551
Study Bldgs: n = 1,283
Commuter Mode Split Correlated to Distance from Home to Metrorail – As Distance Increased, Driving Alone Went Up; Transit Use Dropped.

Q6 How many weekdays do you typically use each of the following types of transportation to get to work?

Source: Resident Surveys

<table>
<thead>
<tr>
<th>Distance to Metrorail</th>
<th>Drive-alone</th>
<th>Transit</th>
<th>Bike/walk</th>
<th>Drive/ride with others</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 2 blocks</td>
<td>48%</td>
<td>37%</td>
<td>8%</td>
<td>2%</td>
</tr>
<tr>
<td>n = 373</td>
<td>50%</td>
<td>33%</td>
<td>9%</td>
<td>3%</td>
</tr>
<tr>
<td>3-5 blocks</td>
<td>61%</td>
<td>29%</td>
<td>2%</td>
<td>4%</td>
</tr>
<tr>
<td>n = 573</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-10 blocks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No sample</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than 10 blocks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n = 337</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Residents who Lived in Areas with Higher “Walk Scores” Drove Alone to Work less, and Walked, Biked and used Transit More than other areas

Similar trends were noticed for “Transit Score”

Q6 How many weekdays do you typically use each of the following types of transportation to get to work?

Source: Resident Surveys
Study Residents’ Commute Mode was Strongly Related to Where they Work

Work in Arlington – 21% Bike/Walk; Work in DC - 53% Transit; Work Elsewhere - 80% Drive Alone

Q6 How many weekdays do you typically use each of the following types of transportation to get to work?
Q34 In what county do you work?
Workplace Parking Cost influenced Commute Mode, Primarily When Monthly Cost was $100+

Q6 How many weekdays do you typically use each of the following types of transportation to get to work?
Q15 How much do you pay to park at work? If you don’t usually drive, enter what you would have to pay if you drove.

Source: Resident Surveys

Mode split - All weekly commute trips
Behaviors: Non-work Travel Mode Split
Study Residents Made a Quarter of their Non-Work trips by Walking and 14% by Transit

2009 Overall County Non-work Trip Distribution

- Drive alone: 40%
- Drive/ride with others: 36%
- Walk/Bike: 16%
- Transit: 8%

2009 Arlington Resident Survey

Q21 How many non-work trips did you make [yesterday] by each of the following types of transportation? Please count both the trip leaving your home and the trip returning home as individual trips.
Respondents who Lived in a Metrorail Corridor Made the Same Number of Daily Non-work Trips as Residents who Lived in Non-Metrorail Areas

But they use **transit** for a much higher share of their trips

**Average Daily Trips**
- Metrorail corridor = 2.33
- Non-Metrorail area = 2.37

Q21 How many non-work trips did you make [yesterday] by each of the following types of transportation?
Residents who Lived in Areas with “Walk Scores” of 70+ Walked for More than a Quarter of their Non-Work Trips; Compared to 1 in 10 walk trips in areas with lower Walk Scores

Q21: How many non-work trips did you make [yesterday] by each of the following types of transportation?
Behaviors: Trip Generation
Location Inside/Outside the Metrorail Corridors was the Most Significant Factor Affecting Vehicle Trip Generation

Buildings Inside the Metrorail Corridors generated about One-Third Fewer Daily Vehicle Trips

<table>
<thead>
<tr>
<th></th>
<th>Mon-Thurs</th>
<th>Friday</th>
<th>Saturday</th>
<th>Sunday</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 0.2 miles from Metro; in corridor</td>
<td>2.10</td>
<td>2.37</td>
<td>1.98</td>
<td>1.77</td>
</tr>
<tr>
<td>&gt; 0.2 miles from Metro; in corridor</td>
<td>2.21</td>
<td>2.33</td>
<td>2.18</td>
<td>2.17</td>
</tr>
<tr>
<td>Outside Metro corridor</td>
<td>3.57</td>
<td>3.91</td>
<td>3.56</td>
<td>3.38</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location</th>
<th>Vehicle Trips Per Occupied Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 0.2 miles from Metro</td>
<td>2.10</td>
</tr>
<tr>
<td>&gt; 0.2 miles from Metro</td>
<td>2.21</td>
</tr>
<tr>
<td>Outside Metro</td>
<td>3.57</td>
</tr>
</tbody>
</table>
Vehicle Trip Generation Rates within Metrorail Corridors were Much Lower than those Predicted Based on ITE Standards

Peak Hour and Daily Vehicle Trips on Weekdays and Weekends were all Significantly Lower

< 0.2 miles from Metro
n = 4

> 0.2 miles from Metro; in corridor
n = 7

Outside Metro corridor
n = 5

Peak Hour Vehicle Trip Generation Rates

Daily Vehicle Trip Generation Rates
Buildings Within Metrorail Corridors had Similar Vehicle Trip Generation Rates
(1.5 - 2.5 Avg Vehicle Trips per Occupied Unit on Mon-Thu)

Difference in Land Use (extended stay hotel) and Location (East Falls Church)

Served by Shuttles or Ongoing Transit Subsidy

Within Metro Corridors  Outside Metro Corridors
Daily Vehicle Trips per Occupied Unit Decreased as Neighborhood Intensity Increased

Neighborhood intensity = Total number of residents and employees per acre within a quarter-mile radius of the building

![Graphs showing the relationship between neighborhood intensity and daily vehicle trips per occupied unit on different days of the week.](image-url)
Peak hour trips for all days were 35-55% less than the predicted trips for the ITE Codes 222 (Apartments) and 232 (Condos) within the Metro corridors; daily trips were 40-60% less.

![Graph showing observed vehicle trips as a percent of predicted trips based on ITE rates (%).]
Behaviors: Vehicle Ownership & Parking
Few Garages Approached Full Occupancy. Vehicle Usage was Lower within Metrorail Corridors. Occupancy did not correlate to Parking Ratio.

- Maximum parking occupancy ranged from 66% to 96%.
- Minimum parking occupancy ranged from 5% to 47%.

<table>
<thead>
<tr>
<th>Distance from Metrorail</th>
<th>Max Parking Occupancy</th>
<th>Min Parking Occupancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 0.2 miles from Metro</td>
<td>75%</td>
<td>25%</td>
</tr>
<tr>
<td>&gt; 0.2 miles from Metro; in corridor</td>
<td>80%</td>
<td>20%</td>
</tr>
<tr>
<td>Outside Metro corridor</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

`n` refers to the number of data points in each category.
Weekday and Weekend Occupancy Showed Consistent Trends, with a Difference in Fri and Sat PM

- Friday evening occupancy is similar to Saturday evening
- Sunday evening occupancy is similar to weekdays
- Weekday occupancy is generally similar

n = 7
Vehicle Ownership Increased with Average Household Income, and Outside Metro Corridors

- By location, condos had higher vehicle ownership than apartments. This may be due to the higher average household incomes of condo owners than apartment renters.
Vehicle Ownership Dropped as Home-Area Transit Improved and the Cost of Residential Parking Went Up

Average vehicles per adult resident

Transit Score
- 25 – 51, n = 261
- 52 – 69, n = 657
- 70 - 89, n = 397
- 90 – 100, n = 0

Cost per month
- $0 per month, n = 629
- $1 to $75, n = 487
- $76 or more, n = 199

Q31 In total, how many motor vehicles, in working condition, including automobiles, trucks, vans, and highway motorcycles, are owned or leased by members of your household?
Q32 Including yourself, how many persons live in your household?
Vehicle Ownership was Highest when the Residential Building had Parking for All Adult Residents

Average vehicles per adult resident

Spaces per Adult Resident in Building

Q31 In total, how many motor vehicles, in working condition, including automobiles, trucks, vans, and highway motorcycles, are owned or leased by members of your household?

Q32 Including yourself, how many persons live in your household?
Study Residents who Knew of Arlington TDM Services Drove Alone to Work Less and Used Transit More than Residents who Did Not Know of the Services

Those who USE Arlington services drive alone even less

Q28 Shown below is a list of organizations and programs that provide transportation information and assistance to Arlington residents and employees. For each, please indicate … if you have used services of the organization, you have heard of the organization but have not used it, you don’t know of the organization.

Not aware of Arlington services
Aware of services
Used services

Note: respondents who “used services” also are included in the “aware of services” group

Source: Resident Surveys

October 2013    ACCS Research: Residential Building Transportation Performance Monitoring Study
Only about 4 in 10 Employees Who had Access to Moderate to High Worksite TDM Drove Alone, vs About 7 in 10 Who Didn’t have Robust Services

Q25 Listed below are travel services or benefits that might be available at your work. For each service or benefit, indicate … if the service: is available and you have used it, is available and you have not used it, is not available.

Mode split - All weekly commute trips

Source: Resident Surveys

- Drive-alone
  - No services reported: 71%
  - Low TDM: 34%
  - Moderate TDM: 40%
  - High TDM: 64%

- Transit
  - No services reported: 5%
  - Low TDM: 25%
  - Moderate TDM: 44%
  - High TDM: 54%

- Walk/bike
  - No services reported: 18%
  - Low TDM: 6%
  - Moderate TDM: 7%
  - High TDM: 10%

<table>
<thead>
<tr>
<th>Mode</th>
<th>No services reported</th>
<th>Low TDM</th>
<th>Moderate TDM</th>
<th>High TDM</th>
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</thead>
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<td>Transit</td>
<td>5%</td>
<td>25%</td>
<td>44%</td>
<td>54%</td>
</tr>
<tr>
<td>Walk/bike</td>
<td>18%</td>
<td>6%</td>
<td>7%</td>
<td>10%</td>
</tr>
</tbody>
</table>

n = 279
Low TDM n = 401
Moderate TDM n = 226
High TDM n = 353
Availability of Individual Bike/Walk Services Seems to Support Use of Bike/Walk for Non-work Trips

Q26 Listed below are travel services or benefits that might be available at the building or in the complex where you live. For each service or benefit, indicate … if the service: is available and you have used it, is available and you have not used it, is not available – Bicycle or walking information; Secure parking for bicycles

Source: Resident Surveys

- Bike/walk info
  - No services reported: 22%
  - Services available: 28%

- Bike parking
  - No services reported: 22%
  - Services available: 26%

Bike/walk Mode split – Typical day Non-Work Trips

n = 569

n = 847

n = 440

n = 976
And Availability of a Discounted Transit Pass Appears to Influence Non-work Transit Use

No difference for transit info or shuttle, but some respondents might have reported regular route transit as shuttle availability.

Q26 Listed below are travel services or benefits that might be available at the building or in the complex where you live….

For each service or benefit, indicate … if the service: is available and you have used it, is available and you have not used it, is not available – Transit schedule or route information; Shuttle.
Future Research Needs
Future Research

Residential Buildings
- Are there differences in travel or parking behavior for CAFs (affordable housing) or “edge sites”?
- Bike and pedestrian trip data

Commercial Buildings
- FY 2014 study of 20-24 buildings
- Site plans and non-site plans
- Lessons learned from 2009 commercial and 2013 residential building studies
- Responding to continued need for more information about commercial parking demand and trip generation
- Data collection October 2013-July 2014; Analysis in Fall FY15