Residential Building Transportation Performance Monitoring Study
Topline Results Presentation

September 2013
Presentation Outline

• Introduction
  • Purpose and objectives
  • Methods
  • Basic descriptors
• Behaviors
  • Mode split
  • Trip generation
  • Vehicle ownership and parking
• Awareness, Preferences
  • TDM
  • Transit
  • Parking
• Uses of this Study
• Future Research Needs
Study Introduction and Methodology
Study Purpose

• Learn about travel and parking behaviors of Arlington residents in high density residential buildings with TDM

• Enhance local evidence of what influences travel for staff and decision-makers charged with advising on parking and TDM requirements and implementing programs and services

• Inform the public about the performance of residential site plans relative to County transportation objectives
Study Objectives

• **Convey mode split and vehicle trip generation:** How well are these buildings supporting Countywide transportation goals and objectives? Are we moving more people without more traffic?

• **Convey parking regulation and availability:** How well are these buildings supplying the “right” amount of parking? Are minimum parking needs met without excess?

• **Convey auto ownership rates:** What sample characteristics may influence, or be influenced by, auto ownership?

• **Compare awareness/attitudes with mode choice and trip generation:** What is the influence of travel assistance services?

• **Compare trip generation to ITE and to TIAs:** How accurate are ITE and TIA estimates for trip generation at these sites?
Sample

- 16 residential site plan buildings and their occupants
  - 8 apartments (incl. one extended-stay hotel)
  - 8 condominiums
  - Range of locations across County, range of densities, some with retail on ground floor
- Building participation required by site plan condition, but resident survey participation voluntary
- Total sample collected between 2010-2012
- Not a random sample
Data Collection: Parking and Trip Generation

• Methods
  • Tube counts or parking operator/garage computer
  • 24 hrs, 7 consecutive days, aggregated into 15-min intervals
  • Parking occupancy counted once manually

• Key variables (dependent)
  • Peak hour time of day (AM and PM)
  • Peak hour trips generated
  • Daily total trips generated
  • Parking occupancy by time of day

• ITE codes used:
  • 221 (low-rise apt); 222 (high-rise apt); 232 (high rise condo/townhouse); 310 (hotel)
Data Collection: Resident Survey

• Methods
  • Voluntary online or paper survey
  • Property manager sends email notification
  • Team conducts on-site events
  • 1,456 completes, overall response rate of 25% of adult residents

• Key variables (dependent)
  • Weekly commute mode split, commute distance, and other commute characteristics \((self-reported by residents; as distinguished from the garage data)\)
  • Mode share of non-work trips
  • Vehicle ownership
Data Collection: Explanatory Variables

• Methods
  • Property manager interview
  • Resident survey
  • Field work
  • Secondary research

• Key variable groups (independent)
  • Building/site factors
  • Neighborhood characteristics
  • Transportation access
  • Information/assistance
  • Demographics
  • Work location
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>More work in Arlington, fewer in DC/Alexandria</td>
</tr>
</tbody>
</table>
Behaviors: Commute Travel Mode Split
Travel Mode Comparisons

- Used resident survey data to calculate travel mode shares for commute travel.
- Compared commute mode split for:
  - All regional commuters (SOC survey)
  - Arlington resident commuters (SOC survey)
  - Employed residents who live in the vicinity of the Site Plan buildings (COG HH Travel Survey)
  - Access to parking at home / work
  - Access to home-area transportation services:
    - Transit (Metrorail distance, Transit Score)
    - Bike paths, walking (Walk Score), highways, carshare
Site Plan Survey Respondents Drive Alone to Work Less than the Regional Average

They use **transit** much more than the regional average and more than the average Arlington residents overall.

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

**Sources:**
- Region and Live in Arlington – 2010 COG SOC Survey
- Site Plan Bldgs - Resident Surveys

**Region**
- $n = 6,050$

**Live in Arlington**
- $n = 551$

**Site Plan Bldgs**
- $n = 1,283$
Compared to Typical Residents of their Immediate Home Areas, Site Plan Respondents Ride Transit Slightly More for their Commute

They “drive/ride with others” for fewer commute trips, but this figure for the HH survey might include some drop-off of children.

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

### Mode split - All weekly commute trips

- **Drive-alone**
  - Study Residents: 54%
  - TAZs in HH Travel Survey: 51%
- **Transit**
  - Study Residents: 36%
  - TAZs in HH Travel Survey: 32%
- **Bike/walk**
  - Study Residents: 7%
  - TAZs in HH Travel Survey: 6%
- **Drive/ride with others**
  - Study Residents: 3%
  - TAZs in HH Travel Survey: 9%

Sources:
- MWCOG Household Travel Survey – 2007-2008; includes only TAZs that correspond to site plan building areas
- Site Plan Bldgs - Resident Surveys

Site Plan Bldgs – n = 1,283
HH Travel Survey – n = 462
Telework excluded from both samples
Site Plan Respondents who Live in a **Metro Corridor** Have a Much Lower Commute Drive Alone Rate than do Non-Metro Area Respondents

Their transit and Bike/Walk mode shares are much higher

Q6 How many weekdays do you typically use each of the following types of transportation to get to work?
Site Plan Respondents who Live in Non-Metro Areas have Similar Commute Mode Profiles as do Residents of their Immediate Home Areas

Except they “Drive/Ride with Others” less often

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

Sources:
MWCOG Household Travel Survey - 2007-2008; includes only TAZs that correspond to site plan building areas
Site Plan Bldgs - Resident Surveys
Note: HH Travel Survey “drive / ride with others” might include some drop-off of children

**Sources:**
MWCOG Household Travel Survey – 2007-2008; includes only TAZs that correspond to site plan building areas
Site Plan Bldgs - Resident Surveys
Note: HH Travel Survey “drive / ride with others” might include some drop-off of children
Site Plan Respondents who Live in Metro Corridors Use Transit and Bike/Walk at About the Same Rate as do Others In their Home Areas, They Drive alone more and “Drive/Ride with Others” less

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

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Sources:
MWCOG Household Travel Survey – 2007-2008; includes only TAZs that correspond to site plan building areas
Site Plan Bldgs – Resident Surveys
Note: HH Travel Survey “drive / ride with others” might include some drop-off of children
Commute Mode Split Clearly Tracks with Distance from Home to Metrorail – As Distance Increases, Driving Alone Goes Up; Transit Use Drops

There were no significant differences in mode use by distance to major highways or distance to bike/walk paths.

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

Mode split - All weekly commute trips

Distance to Metrorail
0 – 2 blocks  n = 373
3-5 blocks  n = 573
6-10 blocks  No sample
More than 10 blocks  n = 337

Source: Resident Surveys
Commute Drive Alone Mode Share Also Decreases as the “Transit Score” of the Resident’s Building Goes Up

Transit use jumps substantially when transit is “Excellent”

- Drive alone: 60% for 25-49 Transit Score, 43% for 50-69, 42% for 70-89, 0% for 90-100
- Transit: 31% for 25-49, 29% for 50-69, 7% for 70-89, 2% for 90-100
- Bike/Walk: 4% for 25-49, 3% for 50-69, 2% for 70-89, 0% for 90-100
- Drive/Ride with others: 2% for 25-49, 7% for 50-69, 9% for 70-89, 0% for 90-100

**Mode split - Typical day Non-Work Trips**

Q21 How many non-work trips did you make [yesterday] by each of the following types of transportation?

Source: Resident Surveys

- 25 – 49
  - n = 188
- 50 – 69
  - n = 808
- 70 - 89
  - n = 420
- 90 – 100
  - n = 0
A Similar Pattern is Evident for Residents who Live in Areas with Higher “Walk Scores”

Particularly when the Area Reaches “Very Walkable”

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

Walk Score

- 0 – 49
  - n = 110
- 50 – 69
  - n = 147
- 70 - 89
  - n = 639
- 90 – 100
  - n = 387

Source: Resident Surveys
Site Plan Buildings that Have Fewer Parking Spaces than the Number of Adult Residents have Lower Commute Drive Alone Rates

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

<table>
<thead>
<tr>
<th>Parking Spaces Per Adult Resident</th>
<th>0 - 0.75</th>
<th>0.76 - 0.95</th>
<th>0.96 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>417</td>
<td>477</td>
<td>389</td>
</tr>
</tbody>
</table>

Source: Resident Surveys
The Commute Drive Alone Rate Falls Noticeably When Resident Parking Charge is $50+ Per Month

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

- Drive-alone
- Transit
- Bike/walk
- Drive/ride with others

Month parking charge for first resident vehicle:
- $0 per month, n = 632
- $1 - $49 per month, n = 169
- $50 - $99 per month, n = 371
- $100 or more per month, N = 111
But **Workplace Parking Cost** has a More Significant Impact on Commute Mode, Primarily When Parking Reaches $100 per Month

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.
Site Plan Respondents’ Commute Mode is 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?
Commute Travel Key Findings

- Study residents’ commute travel is similar to the travel patterns of commuters who live in the immediate neighborhood of the site plan buildings, but they ride transit slightly more.

- **Access to transit service** at home and **walkability** of a residential area are both related to low drive alone rates for commuting.

- **Parking** is a powerful factor in commute decision-making, but parking availability / price **at work** is likely more important than parking **at home**.

- **Work location** is a strong component of commute mode.
Resident Non-Work Travel

- The survey asked respondents if they had made any non-work trips from home “yesterday”

- “Yesterday” was relative to the day the respondent took the survey, so the trips would have included both weekday and weekend trips and can be considered a “typical” day

- **70%** of all respondents said they made at least one non-work trip from home yesterday

- These respondents were asked about the modes they used for these trips
On Average, Site Plan Respondents make 2.3 Non-work Trips per Day – Slightly Under the 2.7 Trips Reported in the HH Travel Survey

But the Site Plan survey likely undercounts non-work trips

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.
Overall, Site Plan Residents Make a Quarter of their Non-Work trips by Walking and 14% by Transit

Mode split - Typical day Non-Work Trips

- Drive alone, 40%
- Drive / ride with others, 21%
- Walk/Bike, 16%
- Transit, 8%
- Bike, 1%

2009 Overall County Non-work Trip Distribution

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

Source: Resident Surveys

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.

n = 1,032
The Non-work Mode Distribution for Site Plan Respondents is Different than for All Residents of their Immediate Home Area

They use transit and drive alone more; drive/ride with others less, possibly because their demographics are different.

Source:
MWCOG Household Travel Survey – 2007-2008; includes only TAZs that correspond to site plan building areas.

Study Residents
HH Survey TAZs

Mode split – Typical day Non-Work Trips

Q21 How many non-work trips did you make [yesterday] by each of the following types of transportation?
Respondents who Live in a Metro Corridor Make the Same Number of Daily Non-work Trips as Do Residents who Live in Non-Metro Areas

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

Q21 How many non-work trips did you make [yesterday] by each of the following types of transportation?

Source: Resident Surveys

Metro Corridor n = 1,044
Non-Metro n = 372

Average Daily Trips
Metro Corridor = 2.33
Non-Metro area = 2.37

Mode split – Typical day Non-Work Trips

Drive-alone
Drive/ride with others
Bike/Walk
Transit
The Mode Share Pattern for Non-Work Trips is Essentially the Same for Residents who Live 0-2 Blocks and 3-5 Blocks from Metrorail; Residents who live more than 1 mile from Metro drive alone for 50% of their non-work trips vs 37% within 5 blocks of Metro.

Q21 How many non-work trips did you make [yesterday] by each of the following types of transportation?

Source: Resident Surveys

Distance to Metrorail
- 0 – 2 blocks n = 373
- 3-5 blocks n = 573
- More than 10 blocks n = 337
Residents who Live in Areas with “Walk Scores” of 70 or More Walk for More than a Quarter of their Non-Work Trips; vs about one in ten trips in less pedestrian-friendly areas.

Mode split - Typical day Non-Work Trips

Q21 How many non-work trips did you make [yesterday] by each of the following types of transportation?

- Car dependent (0-49)
- Somewhat walkable (50-69)
- Very walkable (70-89)
- Walkers’ paradise (90-100)

Source: Resident Surveys

Residents who Live in Areas with “Walk Scores” of 70 or More Walk for More than a Quarter of their Non-Work Trips; vs about one in ten trips in less pedestrian-friendly areas.

Walk Score
- 0 – 49 n = 118
- 50 – 69 n = 161
- 70 - 89 n = 691
- 90 – 100 n = 446
A Similar Walking Pattern is Evident for Residents who Live in Areas with “Transit Scores” of 70 or More;

Transit use does not seem to be strongly affected, but the highest transit score was just 80 and the range was from 45-80

<table>
<thead>
<tr>
<th>Transit Score</th>
<th>Non-Work Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 – 51</td>
<td>n = 188</td>
</tr>
<tr>
<td>50 – 69</td>
<td>n = 808</td>
</tr>
<tr>
<td>70 - 89</td>
<td>n = 420</td>
</tr>
<tr>
<td>90 – 100</td>
<td>n = 0</td>
</tr>
</tbody>
</table>

Q21 How many non-work trips did you make [yesterday] by each of the following types of transportation?

Mode split - Typical day Non-Work Trips

<table>
<thead>
<tr>
<th>Mode</th>
<th>Some transit (25-51)</th>
<th>Good transit (52-69)</th>
<th>Excellent transit (70-89)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive-alone</td>
<td>42%</td>
<td>30%</td>
<td>49%</td>
</tr>
<tr>
<td>Drive/Ride with others</td>
<td>22%</td>
<td>21%</td>
<td>20%</td>
</tr>
<tr>
<td>Bike/Walk</td>
<td>14%</td>
<td>22%</td>
<td>31%</td>
</tr>
<tr>
<td>Transit</td>
<td>14%</td>
<td>11%</td>
<td>17%</td>
</tr>
</tbody>
</table>
Availability of Resident Parking Seems to have Only Modest Impact on the Drive Alone Rate for Non-work Trips

Q21 How many non-work trips did you make [yesterday] by each of the following types of transportation?

Source: Resident Surveys

Parking Spaces Per Adult Resident
- 0 - 0.75, n = 466
- 0.76 – 0.95, n = 518
- 0.96 – 1.10, n = 225
- 1.11 or more, n = 207
Residents Who Pay a Resident Parking Charge of $50 or More Per Month Are Less Likely to Drive Alone for Non-work Trips

But this could be related to lower car ownership generally, rather than a choice not to use a car they own.
Non-work Travel Key Findings

- **Transit, walking, and biking** account for 39% of the non-work trips made by site plan residents.

- The non-work **transit** share is higher for site plan buildings than for their **immediate neighborhoods**.

- But access to transit seems a **less significant** factor in non-work mode choice than for commuting.

- The share of non-work walk trips is clearly related to the **extent of services within walking distance**.

- The role of residential **parking** on non-work mode use is difficult to define – most likely it influences vehicle ownership, which in turn influences mode choice.
Behaviors: Trip Generation
Buildings Inside Metro Corridors Generate Fewer Daily Trips per Occupied Unit

- < 0.2 miles from Metrorail; in corridor: n = 4
- > 0.2 miles from Metrorail; in corridor: n = 7
- Outside Metro corridor: n = 5

Vehicle Trips Per Occupied Unit

Mon-Thurs
Friday
Saturday
Sunday
Buildings Inside Metro Corridors Generate Fewer Peak Hour Vehicle Trips per Occupied Unit

- < 0.2 miles from Metrorail: n = 4
- > 0.2 miles from Metrorail; in Metro Corridor: n = 7
- Outside Metro Corridor: n = 5
Buildings Outside Metro Corridors May be Influenced by Certain Services

- Trips Monday-Thursday
- Extended-stay hotel and East Falls Church locations unusual.
- Buildings outside the corridors that were served by shuttles or transit subsidies had lower daily trip generation rates.
Daily Trips per Occupied Unit Decrease as Neighborhood Intensity Increases

Neighborhood intensity is defined as the total number of residents and employees per acre, within a quarter mile radius of the building.
Density of Residences in Neighborhood

Trips decreased with increases in residential density of the neighborhood.
Density of Employees in Neighborhood

Trip generation generally decreased with increases in employee density in the neighborhood.
Trip Generation is Lower in Areas with Higher Walk Scores

- Car Dependent: 0-49
- Somewhat Walkable: 50-69
- Very Walkable: 70-89
- Walker’s Paradise: 90-100

Vehicle Trips per Adult Resident

- Mon-Thurs
- Friday
- Saturday
- Sunday

Daily Trips Compared to ITE (%)

- Weekday
- Saturday
- Sunday

Car Dependent: n = 1
Somewhat Walkable: n = 2
Very Walkable: n = 9
Walker’s Paradise: n = 4
Density of Destinations in Neighborhood

Walk scores decreased for buildings outside Metro corridors but the trend was not noticeable for buildings with high scores located within the Metro corridors.
No Noticeable Difference in Trip Generation by Average Age of Residents for Buildings in Metro Corridors

- Except for the extended-stay hotel, which doesn’t behave like a residential building.
- Despite differences in incomes and car ownership rates.
Peak Hour Trip Generation within Metrorail Corridors Much Lower Than ITE

Observed Vehicle Trips as a percent of Predicted Trips based on ITE Rates (%)

- Weekday AM
- Weekday PM
- Saturday
- Sunday

<table>
<thead>
<tr>
<th></th>
<th>Weekday AM</th>
<th>Weekday PM</th>
<th>Saturday</th>
<th>Sunday</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 0.2 miles from Metrorail</td>
<td>65.0</td>
<td>55.0</td>
<td>50.0</td>
<td>70.0</td>
</tr>
<tr>
<td>&gt; 0.2 miles from Metrorail; in Metro Corridor</td>
<td>55.0</td>
<td>45.0</td>
<td>40.0</td>
<td>60.0</td>
</tr>
<tr>
<td>Outside Metro Corridor</td>
<td>85.0</td>
<td>75.0</td>
<td>70.0</td>
<td>90.0</td>
</tr>
</tbody>
</table>

< 0.2 miles from Metro
n = 4

> 0.2 miles from Metro; in corridor
n = 7

Outside Metro corridor
n = 5
Daily Trip Generation within Metrorail Corridors Much Lower Than ITE

Observed Vehicle Trips as a percent of Predicted Trips based on ITE Rates (%)

- < 0.2 miles from Metrorail; n = 4
- > 0.2 miles from Metrorail; in corridor; n = 7
- Outside Metro corridor; n = 5

Weekday
Saturday
Sunday
Peak hour trips for all days were 35-55% less than the predicted trips for the ITE Codes 222 and 232 within the Metro corridors; daily trips were 40-60% less. Trip generation comparisons outside the Metro corridors were more varied.
Vehicle Trip Generation Key Findings

- Peak hour and daily trips for buildings within Metro corridors for all days of the week were much lower than predicted trips based on appropriate ITE rates. Some trip generation rates for buildings outside the Metro corridors was also much lower than ITE rates.

- The location within the Metro corridor was the most significant factor affecting trip generation. Density of destinations (Walk Score) and provision of a shuttle or free transit seemed to lower trip generation outside the corridors.

- There was no noticeable difference in the trip generation of apartments and condominiums, or by average age of residents in the building.
Behaviors:
Vehicle Ownership & Parking
Few Garages Approached Full Occupancy, and Many Cars were Rarely Used

- Maximum parking occupancy ranged from 66% to 96%.
- Minimum parking occupancy ranged from 5% to 47%.
Average Maximum Occupancy is Similar for All Locations but Vehicle Usage is lower in the Metro Corridors.
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 Usage was Similar between Apartments and Condos within Corridors

In Metro Corridors

Outside Metro Corridors

Average Daily Trips per Occupied Unit

Vehicles per Adult Resident

- Apartment
- Condo
Friday peak hours had a different pattern compared to other weekdays.
Weekday and Weekend Occupancy Show 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

Average Parking Occupancy for Buildings in Metro Corridors, % of Total Spaces

n = 7
About a Third of Site Plan Respondents Have Fewer than One Vehicle Per Adult in the Household; 7% have no vehicles

Source: Resident Surveys

Within the Metro Corridors

37% of respondents have fewer than one vehicle per adult:

Car Free HH 9%
Car “Lite” HH 28%

n = 1,315

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?

Average Number of Vehicles per Adult Resident

Overall – 0.84

Not employed – 0.77
Employed – 0.85
Apartments – 0.79
Condominiums – 0.88
Car Availability is Measurably Lower Among Site Plan Respondents who Live Within 5 Blocks of Metrorail

**Average Vehicles per Adult Resident**
- Metro corridors – 0.81
- Non-Metro areas – 0.92

**Distance to Metrorail**
- 0 – 2 blocks n = 417
- 3-5 blocks n = 556
- More than 10 blocks n = 87
- Not in Metro corridor n = 255

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?
Car Availability Also Drops as Home-Area Pedestrian Opportunities Increase (Walk Score), but Little Additional Gain after Area is at Least “Somewhat Walkable”

Average vehicles per adult resident

<table>
<thead>
<tr>
<th>Walk Score</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 49</td>
<td>118</td>
</tr>
<tr>
<td>50 – 69</td>
<td>161</td>
</tr>
<tr>
<td>70 – 89</td>
<td>691</td>
</tr>
<tr>
<td>90 – 100</td>
<td>446</td>
</tr>
</tbody>
</table>

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?
Car Availability Drops More Steeply and Progressively as Home-Area Transit Improves – as Defined by Transit Score

Source: Resident Surveys

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?
Car Availability is Highest when the Residential Building has Parking for All Adult Residents

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?
Car Availability Drops as the Cost of Residential Parking Goes Up

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?

Source: Resident Surveys

Cost per month

- $0 per month, n = 629
- $1 to $75, n = 487
- $76 or more, n = 199
Vehicle Ownership Key Findings

- Vehicle ownership increased with **average household income**
- Condominium owners **owned more** vehicles per adult than apartments residents
- There is a definite inverse relationship between vehicle ownership and **transit access**
- Ownership rates were **lower in more walkable areas** but were about the same if the area was “somewhat,” “very,” or “extremely” walkable
Vehicle Ownership Key Findings

- Vehicle ownership is strongly related to the cost of residential parking – particularly at a cost of $95+ per month.

- Parking occupancy and vehicle use seemed unrelated to the spaces per resident provided.

- Overall parking occupancy within Metrorail corridors was similar for all weekdays. Weekend occupancy was higher. Sunday evening occupancy was similar to weekday evenings.
Awareness, Preferences & Influence
75% of Employed Site Plan Respondents said their Employers Offer TDM Service at Work; 44% have access to transit info and 43% have a transit subsidy

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.

Source: Resident Surveys

<table>
<thead>
<tr>
<th>Service</th>
<th>Available, not used</th>
<th>Available and used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transit schedule info</td>
<td>20%</td>
<td>24%</td>
</tr>
<tr>
<td>Transit financial incentive</td>
<td>16%</td>
<td>27%</td>
</tr>
<tr>
<td>Secure bicycle parking</td>
<td>37%</td>
<td>6%</td>
</tr>
<tr>
<td>Telework</td>
<td>14%</td>
<td>24%</td>
</tr>
<tr>
<td>Bicycle/walking info</td>
<td>20%</td>
<td>14%</td>
</tr>
<tr>
<td>Showers / personal lockers</td>
<td>28%</td>
<td>6%</td>
</tr>
<tr>
<td>Carshare</td>
<td>18%</td>
<td>4%</td>
</tr>
<tr>
<td>Carpool matching</td>
<td>18%</td>
<td>1%</td>
</tr>
<tr>
<td>Guaranteed Ride Home</td>
<td>11%</td>
<td>2%</td>
</tr>
<tr>
<td>Preferential carpool/vanpool parking</td>
<td>12%</td>
<td>1%</td>
</tr>
<tr>
<td>Vanpool financial incentive</td>
<td>7%</td>
<td></td>
</tr>
<tr>
<td>Carpool financial incentive</td>
<td>8%</td>
<td></td>
</tr>
</tbody>
</table>

n = 1,316
Nearly Half of Site Plan Respondents have Workplace TDM Services that Constitute a Moderate to High TDM Program

Low TDM = No financial, some support services

Moderate TDM = Some financial, 0-2 support services

High TDM = Substantial financial + 3 or more support services

n = 1,316

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.
Only about 4 in 10 Employees Who have Access to Moderate to High Worksite TDM Drive Alone, vs About 7 in 10 Who Don’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.
85% of Site Plan Respondents said they have Access to TDM Service at Home

Most common service are bicycle and transit-related

Secure bicycle parking: 45% available, not used; 21% available and used
Transit schedule info: 29% available, not used; 37% available and used
Bicycle/walking info: 27% available, not used; 31% available and used
Shuttle to bus / train station: 14% available, not used; 16% available and used
Discounted transit pass: 7% available, not used; 9% available and used
Help finding carpool/vanpool partner: 9%
Reserved carpool/vanpool parking: 6%

Source: Resident Surveys

56% have used a home-based service

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.

n = 1,476
Access to **Home Area Services** Seems Not to Have an Influence on Commute Mode

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.

Low TDM (0 to 2 services)  
\[ n = 495 \]

Moderate TDM (3 or more services, no financial incentive or shuttle)  
\[ n = 289 \]

High TDM (3 or more services, including financial incentive or shuttle)  
\[ n = 393 \]
Availability of Home Services Seems Slightly Related to Non-work Trip Mode for Bike/Walk

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.

Mode split - Typical day Non-Work Trips

- Drive-alone: 44% (No services reported), 40% (Services available)
- Drive/ride with others: 17% (No services reported), 21% (Services available)
- Transit: 18% (No services reported), 13% (Services available)
- Bike/walk: 22% (No services reported), 26% (Services available)

Source: Resident Surveys
No services reported n = 172
Services available n = 1,244
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.
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

Transit route/schedule info
- No services reported: 15%
- Service available: 13%

Discounted transit pass
- No services reported: 12%
- Service available: 19%

Shuttle to bus/train
- No services reported: 13%
- Service available: 14%

Source: Resident Surveys
Respondents said Safe Sidewalks / Bike Paths and Transit Subsidies would Encourage them to Make More Trips by Non-drive Alone Modes

Q27 If the following services were available at the building or complex or in the area where you live, how likely would you be to make more of your trips by carpooling, public transit, bicycling, or walking?

Source: Resident Surveys

Base for likely to try non-drive alone mode varies by service (n =):
- Transit pass 1,241
- Sidewalks 1,476
- Shuttle 1,033
- Transit sched 513
- Bike/walk info 628
- Bike parking 499
- CP/VP partner 1,326
- CP/VP parking 1,369

Service available now 4
5-Very likely

Discounted transit pass 16% 12% 45%
Shuttle to bus / train station 30% 8% 19%
Transit schedule info 66% 11% 15%
Bicycle/walking info 58% 11% 14%
Secure bicycle parking 66% 7% 12%
Help finding CP/VP partner 10% 63%
Reserved CP/VP parking 7% 4% 1%
Respondents said Safe Sidewalks / Bike Paths and Transit Subsidies would Encourage them to Make More Trips by Non-drive Alone Modes

Base for likely to try non-drive alone mode varies by service (n =):
- Transit pass 1,241
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Q27 If the following services were available at the building or complex or in the area where you live, how likely would you be to make more of your trips by carpooling, public transit, bicycling, or walking?

- Discounted transit pass
- Shuttle to bus / train station
- Transit schedule info
- Bicycle/walking info
- Secure bicycle parking
- Help finding CP/VP partner
- Reserved CP/VP parking

Service available now, Don't know, 1 or 2 (not likely), 3, 4, 5-Very likely
78% of Site Plan Respondents Know of ART Bus; Awareness Also is High for Commuter Store (51%) and Bike Arlington (48%)

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.

Source: Resident Surveys

2009 Overall Co Awareness

ART 79%
Commuter Store 51%
BikeArlington 45%
WalkArlington 38%
Commuter Connections 32%
WalkArlington 26%
CommuterPage.com 19%
Arlington County Commuter... 19%
Arlington Transportation Partners 17%
Commuter Direct 15%

Aware / not used

Aware and have used

Arlington County Commuter... 19% 3%
Arlington Transportation Partners 17% 2%
Commuter Direct 15% 2%
Commuter Page.com 19% 8%
WalkArlington 26% 9%
BikeArlington 34% 14%
Commuter Connections 32% 6%
Commuter Store 30% 21%
ART bus 46% 32%
WMATA / Metro 8% 83%

85% aware of an Arlington TDM service (other than ART)
34% have used an Arlington TDM service

n = 1,283

September 2013         ACCS Research: Residential Building Transportation Performance Monitoring Study  80
Site Plan Residents who Know of Arlington TDM Services Drive Alone to Work Less and Use Transit More than Residents who Don’t 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.

Source: Resident Surveys

Not aware of services n = 179
Aware of services n = 1,104
Used services n = 629
Note: respondents who “used services” also are included in the “aware of services” group

Mode split - All weekly commute trips

Drive-alone
- Not aware of Arlington services
- Know any Arlington service
- Used any Arlington service

Transit
- Not aware of Arlington services
- Know any Arlington service
- Used any Arlington service

Bike/walk
- Not aware of Arlington services
- Know any Arlington service
- Used any Arlington service

Carpool/van pool
- Not aware of Arlington services
- Know any Arlington service
- Used any Arlington service
A Similar Pattern in Evident for Awareness / Use of Arlington TDM Services and Mode for Non-work Trips

But which came first – TDM service awareness or mode use?

Mode split - Typical day Non-Work Trips

Source: Resident Surveys

<table>
<thead>
<tr>
<th>Mode</th>
<th>Not aware of Arlington services</th>
<th>Know any Arlington service</th>
<th>Used any Arlington service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive alone</td>
<td>39%</td>
<td>53%</td>
<td>35%</td>
</tr>
<tr>
<td>Drive/ride with others</td>
<td>21%</td>
<td>18%</td>
<td>21%</td>
</tr>
<tr>
<td>Transit</td>
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<td>10%</td>
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<td>28%</td>
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Note: respondents who “used services” also are included in the “aware of services” group

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.
Awareness / Influence Key Findings

- **Use of non-DA modes** is higher for commute and non-work trips when respondents know of Arlington services, more still if they have used the services.

- There is a strong relationship between **workplace TDM and use of non-drive alone modes for commuting**; modest relationship of commute mode with home-based TDM.

- 75% of respondents have **TDM services at work**.

- 85% of respondents mentioned having at least one **home-based TDM** service – 56% have used services.

- **Home-based transit and bike/walk services** seem to influence use of these modes for non-work trips.

- **Awareness of Arlington TDM** services is the same as for the Co overall – 34% have used an Arlington service.
Uses of this Study
Uses of Building-Level Data

• As baseline for future evaluations
• ATP can work with property managers on tailored program improvements
• Send to ITE to improve their trip generation factors
Uses of Aggregate Study Results

- Enhance understanding of behavior and influence of TDM at site plan buildings
- Improve new/existing ATP campaigns
- Inform parking discussion and recommendations for residential site plan proposals
- Inform overall parking and TDM policy recommendations
Future Research Needs
For Further Exploration

• What is the pedestrian trip generation of these sites?
• What is the bicycle trip generation of these sites?
• How do site plan residential buildings compare to non-site plan residential buildings?
• What routes people take on their commute?
• Do “edge sites” (Mosaic, Bergmann’s, Dominion Heights) behave differently than on-metro sites or off-metro sites?
• Do CAFs generate trips, and demand parking, differently than market rate units?
Future Research Strategies

• Increase the sample of buildings overall, for more confidence
• Expand the range of settings
  • Geography
  • Building types
  • Neighborhood characteristics
• Increase the sample of CAFs
  • Need additional or different questions for property manager, residents to understand CAFs
• Study non-site plan residential buildings