King County METRO

Right Size Parking

Research Methodology
Phase I – Site Selection and Field Data Collection

BACKGROUND

King County Metro has been awarded a grant in the Federal Highway Administration (FHWA) Value Pricing Program. The project will assemble local information on multifamily residential parking utilization to guide parking supply and management decisions in the future.

As part of the grant effort, research will be conducted in two phases:

- **Phase I** – Site selection and field data collection consisting of on-site parking inventory counts and assembly of physical building and pricing information.
- **Phase II** – Independent variable data collection, statistical analysis, and model development will be done to predict parking utilization.

This document covers the Phase I research methodology. The collection of parking inventory data will help King County assess parking utilization in existing multifamily residential buildings to learn more about resident's parking needs. Approximately 240 properties will be the subject of parking field counts to assess residential parking utilization. Due to time and budget limitations, a specific site selection methodology was developed to ensure a representative sample is collected within the constraints of the project. In addition, information about the physical building characteristics and parking/housing pricing will be collected to support the Phase II research.

Given the relatively large number of sites, a data collection team will be used to conduct parking counts. To manage the data collectors and ensure quality data the following methodology and protocols were developed.

1. PROBLEM AND RESEARCH OBJECTIVE

Research has shown that over-building of residential parking supply leads to increased automobile ownership, vehicle miles traveled, congestion and housing costs.[1,2] Recent research has found that households with guaranteed parking at home have a greater propensity to use the automobile for journey to work trips, even when those trips are

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[1] Shoup, Donald C. 2005. The high cost of free parking. Chicago: Planners Press, American Planning Association.

[2] Litman, Todd. 2009. "Parking Requirement Impacts on Housing Affordability". Victoria, BC: Victoria Transport Policy Institute. http://www.vtpi.org/park-hou.pdf.

well served by transit.[3] In addition, misaligned parking policies present barriers to smart growth and efficient transit service provision.[4,5] Interviews with local King County development stakeholders in the fall of 2009 revealed a general lack of locally credible and context-sensitive data on parking utilization, which leads developers and financiers to remain conservative and over-build the parking supply. Also, jurisdictional parking minimums in zoning codes can limit developers from building parking to meet the true demand.[6]

In addition, the market for housing and vehicle ownership is shifting, with an increasing trend of households owning only one or no vehicles. According to the American Community Survey, 8.9% of housing units in King County do not have access to a vehicle. In the City of Seattle, 15.5% do not have access to a vehicle.[7] This data shows there is a significant share of households with no vehicle and yet jurisdiction zoning codes often require parking for all housing. This predicament leaves the housing market unable to respond to the market share of households with zero vehicles.

This Phase I research methodology is designed to provide context-sensitive multifamily residential parking utilization information. This information will be incorporated into the Phase 2 research which will be provided on a website to guide stakeholder's decisions about building new parking and managing existing parking. The objectives of the Phase I research design are to:
- Conduct parking inventory counts in King County, WA to ensure the highest possible statistical significance within the project time and budget constraints
- Provide a standard and replicable method to conduct field work to ensure consistency and accuracy in data
- Support the data needs for Phase II statistical research analysis

2. SITE SELECTION

2.1. Constraints

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[3] Weinberger, Rachel. 2011. "Death by a Thousand Curb-cuts: How minimum parking requirements stimulate driving". Paper presented at the annual meeting of the Transportation Research Board, Washington, D.C., January.

[4] Forinash, Christopher, Adam Millard-Ball, Charlotte Dougherty, and Jeffery Tumlin. 2004. "Smart Growth Alternatives to Minimum Parking Requirements." Paper presented at the annual meeting of the Transportation Research Board, Washington, D.C., January.

[5] Willson, Richard. 2005. "Parking Policy for Transit-Oriented Development: Lessons for Cities, Transit Agencies, and Developers". Journal of Public Transportation. 8 (5): 79-94.

[6] Rick Williams Consulting. 2009. Technical memorandum to King County Metro. "Preliminary Findings: Right Sizing Parking [REVISED]".

[7] American Community Survey. 2005-2009 American Community Survey 5-Year Estimates. http://www.factfinder.census.gov/servlet/ADPTable?_bm=y&-geo_id=16000US5363000&-qr_name=ACS_2009_5YR_G00_DP5YR4&-ds_name=&-_lang=en&-redoLog=false

To provide data for the statistical analysis portion of the research (Phase II), a sample of multifamily residential properties must be selected to conduct data collection (detailed in Section 4 of this document). Parking at multifamily developments is often supplied in underground or structured parking garages that are locked for tenant security and safety. To collect parking data at these properties, access to a private garage is often required. Based on local and national past experience, this process can be difficult as some property managers are not willing to provide access to the private parking garages for research purposes.[8] This restricted access has an impact on the site selection methods used in this research. Common random sampling techniques cannot be used in this process due to the excessive time that would be required to request site access from each property individually. To overcome this barrier, this research will select sites using a combination of a convenience and quota sampling techniques described in the next section.

2.2. Selection Methods

The site selection process uses the following steps:
1. Define the research location criteria
2. Define the building characteristic criteria
3. Define site selection process

Location Criteria

The geographic location of eligible properties was defined to ensure the sample was focused in areas where future multifamily residential development is likely zoned and expected to exist. An eligible property must meet be located in one of the following geographic areas:

1. Urban Growth Center[9]

2. Within 0.5 mile radius of an Activity Center[10] point

3. Within 0.5 mile radius of existing or planned frequent transit service stops or stations (Sounder, LINK, RapidRide, Seattle Streetcar)

4. Within 0.25 mile buffer of existing frequent all-day[11] transit routes.

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[8] Daisa, J. M. and T. Parker. Trip Generation Rates for Urban Infill Land Uses in California. ITE Journal, Vol. 79, No. 6, 2010, pp. 30-39.

[9] Puget Sound Regional Council defines Urban Growth Centers as a part of the regional planning process. Growth centers have been identified for housing and employment growth, as well as for regional funding. A list of growth centers can be found here: http://psrc.org/growth/centers.

[10] The King County defines Activity Centers as a part of the recently adopted Strategic Plan Service Guidelines. Activity Centers are areas of concentrated activity that connect the County's all-day and peak transit network. A list of activity centers can be found here: http://metro.kingcounty.gov/planning/pdf/KCMT_ServiceGuidelines_07-11-11.pdf

Building Characteristic Criteria

To be eligible for inclusion in the research sample, a property must be a multifamily residential property with a size equal to or greater than 10 units.[12] The units can either be leased as apartments or sold as condominiums. The property may contain mixed uses within the development, but this research will only inventory the residential portion of the parking (process explained in Section 3).

Site Selection Process

The site selection process uses a combination of convenience and quota sampling. Convenience sampling is used to overcome issues with gaining access to private property. To reduce the time and resources required to gain permission to each property in the sample, research staff will seek permission for multiple properties at once by asking for access to the entire portfolio of a local development or property management company. Considering this method has potential to produce an unrepresentative sample, research staff will conduct periodic Chi Square statistical checks of independent variable distribution of the sample against the distribution of the sample universe. A list of independent variables to be used in this study is included in the Phase II document, Attachment A. These checks will occur every time 50 additional properties are added to the sample.

For example, when staff is successful at acquiring permission from the first 50 properties, staff will then compare the variable distribution of the sample against the distribution of the sample universe. To normalize the sample and the sample universe, frequency distributions will be created using ranges within each independent variable dataset. The Chi Square test will then determine whether or not the sample is representative of the sample universe, at a given significance level. If the sample is representative, then research staff will continue using the convenience sampling process until the next 50 properties are added to the sample. If the sample is not representative, then research staff will start to selectively seek permission from properties that contain independent variable characteristics that meet criteria to fill quota where it is needed (or not representative). For example, if the first 50 properties happen to be all within Census blocks with high income households in comparison to the rest of eligible research locations (sample universe), this would be an indication of an unrepresentative sample and would trigger staff to add properties to the sample that are located in areas with lower and middle income households.

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[11] Frequent all-day transit routes are defined by the King County Metro Strategic Plan for Public Transportation 2011-2021, Service Guidelines. The route must operate throughout the day, seven days a week, with 15 minute frequencies (or more) during the weekday peak and off-peak hours and 30 minute (or more) during the weekday night and weekend hours.
http://metro.kingcounty.gov/planning/pdf/KCMT_ServiceGuidelines_07-11-11.pdf

[12] The 10 unit minimum was chosen to focus the properties included in the study to include those that have significant capital investment in a parking lot, structure, or garage.

3. FIELD DATA COLLECTION

3.1. Parking Utilization Counts + Field Observations

To assess parking utilization in each residential development, one parking utilization count will be conducted for each site. The method used to conduct the parking utilization count will follow the Institute of Transportation Engineer's (ITE) method presented in their Parking Generation manual.[13] Parking utilization is defined as the "accumulation of vehicles parking at a given site at any associated point in time…This value should be the highest observed number of vehicles within the hour of observation". Parking counts will be completed during mid-week days (Tuesday through Thursday) at the peak parking demand hours for residential land uses, which falls between 12:00 a.m. to 5:00 a.m. Parking counts will not be completed during weeks with major holidays considering residents could be on vacation. The parking utilization count will consist of counting the number of physically parked cars in the residential portion of the parking garage or lot at the time of the count. On-street parking will be included in the residential count only if a property manager indicates that a distinct supply of on-street parking has been reserved for the property's use. Commercial parking will not be counted during a residential count, based on the assumption that such uses are not in operation during the 12:00 a.m. to 5:00 a.m. period.

3.1.1. Mixed-Use Buildings (if applicable)

Although non-residential parking counts are not planned in this research scope, time and budget may be available to expand the scope. If applicable this section outlines the methods used for mixed-buildings.

Performing parking counts in mixed-use buildings presents some unique challenges not found in single use residential buildings. Commercial parking counts require distinguishing between residential and commercial parking demand during daytime hours. The difficulty in making this distinction is dependent on how parking is managed by the property. In instances where the parking is physically separated or residential parking permits are used (and enforced) it is not difficult. It becomes a challenge when the spaces are freely shared. To assess parking utilization of non-residential uses in mixed-use buildings, some counts will have to be performed during the daytime or evening for an extended period that matches the time of peak utilization for that use. It may be ideal to perform a count where the spaces are shared since this may be a key factor in being able to reduce parking supply based on opposite periods of demand. Collection methods in these cases may involve:

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[13] Institute of Transportation Engineers. 2004. Parking Generation. Washington, D.C., USA: Institute of Transportation Engineers.

- **ULI Shared Parking Methodology Analysis** – In this method, no effort is used to distinguish between what land use each vehicle is associated with. The team would choose a mixed-use control site where the exact land use mix and sizes are known – most likely a complex site with multiple shared uses. Count the total combined parking utilization throughout the entire day. Compare the observed utilization to the ULI Share Parking methodology to see if it aligns with the suggested parking demand rates.

- **Query Washington State Department of Licensing (DOL) database** for number of registered vehicles and subtract residential cars during daytime commercial count. The data collector will need to utilize the license plates of the residential cars to subtract the actual vehicles that are parked on-site during the daytime account. This assumes that the DOL database is sufficient to assess residential parking utilization and would not require a separate residential count.

- **Residential parking permits**, if used, would enable the data collector to separate residential from non-residential parked vehicles.

- **Signage to designate residential/non-residential parking,** if used, would enable the data collector to separate residential from non-residential parked vehicles.

- **A residential parking count** that includes recording all residential license plates could be used to filter out residential cars during a daytime commercial count in a mixed-use building.

3.1.2. *Physical Building and Pricing Information*
In addition to counting parking utilization the data collectors will be responsible for collecting other building and pricing information listed in Attachment A. The information will be obtained primarily through a combination of fieldwork and information supplied by the property manager. A significant part of the data collection effort is to obtain data in support of Phase II including independent variables that may impact parking utilization.

3.1.1. *Quality Control*
To ensure the quality of the data collected the project team will perform follow-up parking counts within a week after the initial count for a sample of the buildings counted.   Immediately following the initial count the Data Collection Manager will deploy another data collector the site within a week. The quality control counts will be selected at random. The number of sites to receive quality control counts is TBD. The data collector will follow the same procedures as for regular counts including collecting all available on-site fieldwork data. The follow-up data collection effort will be performed by separate staff from the original counter. The original counter will be

unaware of the follow-up count occurrence. Either the Data Collection Manager or data collector will need to contact the property manager to gain access to the site. Each property manager will be notified that a follow-up count may be required and to gain consent during the initial contact.

3.2. Information Flow + Field Count + Documentation

With 240 sites and three to four field workers, consultants and County staff communication on this project will be critical to its success. The fieldwork is one piece of a larger project to assess parking utilization in multi-family and mixed-use buildings along with other independent variables that may affect parking utilization. The County intends to submit the data and findings to ITE for inclusion in the next version of the *Parking Generation*. The data is also to support Phase II and the developments of a tool to help communities better predict parking utilization. Therefore, data management and quality control are equally important aspects of this project. Fortunately we have emerging technological assets that will assist us in our efforts to streamline the process.

3.2.1. *Information Flow*

King County staff and their partners are responsible for selecting the sites and coordinating the initial consent from the property owners. Once a site is selected and ready for a field visit county staff will forward the information on the site, including the address and property manager contact information, to the Data Collection Manager via email.

The Data Collection Manager will record the information in a master data sheet and post the site on the project's SharePoint site provided by King County. SharePoint is project management software that allows for shared calendars, project milestones, assigning tasks, project team communication and file sharing. The site is only accessible by project team members and not available to the general public.

Once posted on the site, the next data collector in the rotation will have a certain amount of time for which they have priority to perform the count. If they do not respond or cannot conduct the count, the next data collector in the rotation has the first option and so on.

3.2.2. *Field Count*

The fieldwork effort will usually require two visits to each site; an initial visit to meet with the property manager to discuss data needs (if any) and coordinate access for the actual parking count to be performed during the second site visit. Some of the information needed will be difficult to obtain from field observations, so the data collector will email the property manager an Adobe form in advance of the first visit to be filled out and emailed back to the data collector. To the best of their ability, data

collectors will arrange to drop off the key (if used) upon completion of the second visit to avoid a third trip and/or a mailing to return the key.

To perform the count the data collector will go to the site within the designated time period (12-5am) and perform the count. The count will be recorded on the standard data sheet that will be provided. Once the data collector finishes the fieldwork he/she will fill in the remaining information into the Adobe form. The Adobe form data can be compiled and exported to excel. The added advantage is the Adobe form creates a user-friendly record of the account for use in the future.

To ensure that the data collectors are indeed counting the site at the proper time, as well as to provide a clear record of the counts and increase the quality of the data we may utilize the following technologies:

- **Geo-referenced picture** of the building sign or other identifier using a smartphone or camera equipped with this ability. One benefit is that a wider range of potential data collectors may have a phone that has this capability. Images will only be used for internal purposes.

- **Google Latitude** allows users to "check in" that allows the Data Collection Manager to see their location using a phones GPS capabilities. The data collection manager could verify the data collectors performed the count at the appropriate time, take a screen shot of the location and file it. One added benefit is that the Data Collection Manager can track the data collectors in real time, but it requires the data collectors to have a smartphone.

- **Evernote** is a cloud based note program that provides a geo-referenced location (map) of where the note was taken. Notes taken on smart phones with the Evernote program can be recorded with the count data and sent to the data collection manager before leaving the site. The note will be titled with the address of the site. The benefit of using Evernote is that the program has database features that will store the data, allow it to be searchable and shared amongst project team members. The downside is that it would require data collectors to have the program and a capable smartphone. **Evernote is the preferred method if available to data collectors.**

- **Photos** of the site that also show the time of day and possibly the date on a phone could be used to verify counts. If the picture had a timestamp it would improve reliability and verification. While it's the least cost option, it is less reliable than the other methods.

3.2.3. Documentation

The Data Collection Manager will collect the count data and verification information and enter it on the master spreadsheet file (for integration into GIS) and in Evernote. The Evernote database can be shared with other project team members and will include all administrative documents including this methodology. It should be noted that all information collected from properties will be kept confidential to honor confidentiality agreements between each property and the County.

The Data Collection Manager will also provide a geo-referenced online map (ESRI ArcExplorer Online) of the sites and basic count data, which will be shared amongst the project team.

3.2.4. Reporting

The Data Collection Manager will report on data collection progress to King County staff on a quarterly basis. Any special findings or issues will be reported as needed.

4. PILOT PROJECT

In order to test the methodology and data collection process we will conduct a pilot project including a mix of 20 sites. We may begin initial meetings with property managers before we have 20 properties identified, but will not perform the actual count until we have identified 20 sites for data collection. Once the initial 20 counts are preformed the Data collection Manager will provide a summary of the data and an assessment of the methods to be reviewed by the project team. The methodology may be revised based on the results of the pilot effort.

Attachment A - Building Information Form

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Field Data Sheet

	To be completed by data collector

Contact Information

Parcel PIN	
Building Name:	
Building Address:	
Contact Name:	
Contact Title:	
Organization:	
Email:	
Phone:	
Would you like to keep this data anonymous? (Yes/No)	

Parking Information

Total # Parking Spaces (including residential, commercial, retail and shared spaces)	
# Parking Spaces for Residential Use (off-street and on-site)	
# Parking Spaces for Residential Use (reserved off-site or on-street)	
# Parking Spaces dedicated for vanpool/van share	
# Parking Spaces dedicated for carshare	
# Parking Spaces for Nonresidential Use (separated from residential stall)	
# Parking Spaces for Nonresidential Use (shared with residential stalls)	
Total # Bike Parking Spaces	
Total # Scooter/Motorcycle Parking Spaces	
On-Street parking on block face(s) adjacent to building (yes/no)	
On-Street Parking Restrictions, if any	Other
Residential Parking Pricing (yes/no)	
Residential Monthly Parking Pricing Amount Per Space, if any	
Non-Residential Parking Pricing Amount Per Hour, if any	
Residential Parking Utilization (if known through # of residential parking permits sold or other means)	
Parking Demand Count Date	
Parking Demand Count Time	
Total Parking Inventory Count (vehicles observed during parking count)	

Building Information

Total Square Footage	
Residential Square Footage	
# of Building Floors	
Non-residential building uses (please list)	
Total # of Residents	
Total # of Residential Units	
Total # of Affordable Units	
Number of units affordable to 80% to 100% median	
Number of units affordable at 60% to 80% median	
Number of units affordable below 60% median	

Provide the information below for each type of unit listed:	Total	Studio or Eficiency	1 bedroom	2 bedroom	3 bedroom
# of Senior Housing Units					
# of owner occupied units					
Average Price Per Square Foot of Owner Units					
# of rental occupied units					
# of rental unoccupied units					
Monthly rental cost					
Other Transportation Demand Management Strategies Used (bicycle facilities, transit passes, etc.) - Please list.					
Transit way finding or information offered on-site? (Y/N - if yes, explain)					