

Task 2.3 Analysis of Parking Data

Scope

There are three parts to the analysis:

- determination of the parking behaviour of trip-makers from the household surveys;
- analysis of supply characteristics using independent data;
- combining the two data sets in a spreadsheet to attribute average parking costs to different trip types.

The data are designed to enable the spreadsheet illustrated below (for the CBD only, but may be required for other parts of the study area) to be filled in with real data. The table enables the average price of parking to be calculated by purpose. The number of spaces is not used in the base year, but we could make use of the data in forecasting or policy testing (for example, if we reached the capacity of free spaces, we could allocate all additional traffic to paid spaces).

WTSM Parking Spreadsheet

Wellington CBD			Average parking duration			Average parking cost			Parking Capacity (Spaces)					
Parking Type	% trips			HBW (Days)	BU (hrs)	Other (hrs)	HBW (per day)	BU (per hr)	Other (per hr)	Long Term	Short term			
residential	0%	0%	0%	1	3	1.5	\$0.0	\$0.0	\$0.0	n/a	n/a			
public unmetered on street	10%	5%	40%				\$0.0	\$0.0	\$0.0	0	1,000			
public unmetered off street	10%	5%	10%				\$0.0	\$0.0	\$0.0	500	2,000			
public metered on street	15%	50%	10%				\$12.0	\$0.5	\$0.5	0	5,000			
paid	15%	25%	0%				\$8.0	\$1.0	\$1.0	5,000	5,000			
employer	50%	15%	0%				\$0.0	\$0.0	\$0.0	50,000	5,000			
customer	0%	0%	40%				\$0.0	\$0.0	\$0.0	n/a	10,000			
Total	100%	100%	100%							\$3.0	\$1.5	\$0.1	55,500	28,000
Average parking cost per trip														

Household Survey Analysis

This is an analysis of car driver mode linked trip data by purpose and destination. It concerns the parking place data collected in the household trip diary.

Table 1: for each purpose and for each geographical sector, tabulate the proportions in each category of:

- parking place,
- parking fee, and
- who paid

Notes: for home-based trips, only tabulate the parking characteristics at the destination end of the trip (the non-home end). For non-home based trips, tabulate the destination end of the trip.

Table 2: this depends on the results of Table 1. It seems possible that we may find the following:

- few pay fees for parking outside the CBD;
- if so, we will need to focus on the CBD and repeat Table 1 for this area; it is remotely possible that we might want to look at regional CBDs.

Table 3: if we find that parking fees are significant for purposes other than commuting, we will need to compute the average length of time spent parking (from the trip times). We will need to check that these average times are the same for: people who pay for parking, people who park but don't pay and, in principle, people who use public transport.

From an analysis of these data we should be able to complete the first 2 blocks of columns in the spreadsheet.

Parking Supply Analysis

We would like two types of data: the volume of parking spaces by type and the unit parking price (per day, per hour etc) – see spreadsheet. The data is for defined areas: the CBD and any other areas which would be helpful to us.

I think that data on the prices will be easiest.

The number of spaces is not so important – it is ONLY important for the CBD and is only needed for future policy runs with the model.

Further Possible Refinements

The issue has been raised of representing parking spaces in the CBD explicitly in the model if we have a fine zone system. Issues to consider are:

- with a typical coarse zone system, the parking place is likely to be in the same zone as the activity and there is therefore no reason to distinguish them;
- in a fine zone system, parking may be in another zone and assigning car traffic to the ultimate destination may, at least in theory, lead to inaccurate paths to the wrong place on the road network.

The minimum requirements to cause us to consider refinements appear to be:

- evidence that a significant proportion of car users attracted to the CBD do not park in the destination zone and/or park at a significant time/distance from their destination; this is readily tested with household survey tabulations which should distinguish work, business and other trip purposes;
- evidence that the distribution of parking spaces is not uniform across the CBD; this is likely to mean that a significant proportion of spaces is provided by a limited number of off-street public car parking buildings; some refinement of the analysis of the parking supply data (if it is available in the requisite detail) should cover this.

Supposing that these analyses indicated that it might be worth changing the model specification, there are a number of possibilities.

Option 1 would be to connect zones to the network via the car parks. The process might involve:

- putting capacities on centroid connectors relating to the present zonal parking capacity (excepting parking buildings);
- representing all parking buildings as network nodes, linking them to zones within their catchment with additional centroid connectors, and linking them to the network with connectors with appropriate capacities (an issue which may not be simple if the building can be accessed from more than one link); in all cases some steeply sloping speed/flow curve would be associated with the connectors;
- in principle, this approach would allow a modelled change in the distribution of parking spaces or the introduction of new parking buildings;
- a difficulty would be that we would expect parking locations to vary by purpose, at least between long (HBW) and short term (other purposes) parking; we do not assign traffic by purpose (unless we wished to expand the multi-user assignment concept), but we will assign peak and interpeak travel separately, which goes part way to achieving the required discrimination; a complication is allocating capacities to short term spaces.

Option 2 would be on a zonal basis:

- using the household survey we would prepare a table allocating travel to each CBD zone destination to the zone where the car was actually parked: we might imagine that this would not allocate all trips to the destination zone;
- conceivably there could be separate zones for parking buildings, which might be attractive for network loading precision, but is unattractive for modelling new parking buildings, potentially requiring a zone system extension;
- we would then need procedures for amending this allocation in future (presumably a simple logit function allocating the surplus demand to zones with excess parking supply on basis of access time might do it.

In both options there would need to be means of predicting future changes in parking supply.

Before we give these options serious consideration we need to understand the extent to which it is an issue.

[Note that people may trade-off parking cost against walk access time such that the generalised costs of parking cost + a short walk may be similar to free parking + a longer walk.]