

APPENDIX D

Description of Shared-Parking Model

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This appendix summarizes the methodology used for a parking demand-generation model for the TOD Parking Study sites. The shared-parking model used for this study generated parking-demand scenarios based on industry-standard measures of demand-generation for common land use types. These measures were then compared to the actual local context via in-person parking inventory and utilization counts on the sites. The following objectives were completed by this analysis:

- Determine the differential between the expected industry-standard parking demand for the site and the parking ratios requested by development stakeholders and/or mandated by municipal codes
- Compare findings to actual parking demand based on local field observations
- Help identify tools necessary to help meet desired parking ratios

Model Rationale

Understanding the relationship between land use patterns and parking demand is critical. A study area functions as a mixed-use parking district with a unique user behavior profile that poses challenges in managing parking resources. Traditional development expectations often assume that parking will be provided for each separate use on site, with little or no consideration of shared parking or access among different uses. This may be applicable to sites with lots of space and isolated single land uses, but is not appropriate in a mixed-use environment (particularly in a transit-oriented district and/or a walkable place) where a number of land uses, each with different demand profiles across the course of the day, are located

in close proximity to each other and could more efficiently share local parking resources.

In a principle often referred to as “staggered peaks,” the actual demand for parking varies by use throughout the hours of a day and days of a week: office space generates parking demand during traditional weekday business hours; parking for residential housing is often highest overnight as many residents use their cars during the day; and the parking demand generated by bars and restaurants is highest during meal times and in the evening. If parking is shared between multiple uses, the aggregated parking demand by time of day is less than the total that would be programmed separately for each use.

Traditional Demand Projections

The shared parking demand forecast methodology is different from traditional parking generation due to the consideration of staggered peaks. Most often, parking generation analyses rely solely on the Institute of Transportation Engineers’ (ITE) periodic report titled Parking Generation, which is the prevailing national standard in determining expected parking demand for a development or set of land uses. ITE standards are based on parking demand studies submitted to ITE by a variety of parties, including public agencies, developers and consulting firms. These studies are often based on peak-hour demand measures at suburban sites with isolated, single land uses that provide free parking.¹

¹ Institute of Transportation Engineers, Parking Generation 4th Edition, 2010, page 2

To estimate parking demand generated by a development, multiply a peak parking demand factor for each land-use type by the physical size of each use type and assume that the peak amount of parking is required all day, every day and exclusively for that use. As shown below, the peak-demand measures are summed together to project the project’s total parking supply need.

Example Summing Land Use Parking Peaks

Land Uses in a Development	Peak Parking Demand
Residential	300
Office	400
Restaurant	650
Combined	1,350

Shared Parking Model Process

By contrast, the shared parking model used for this study applies time-of-day factors, using the Urban Land Institute’s (ULI) Shared Parking Manual (2nd Edition, 2005) to track the accumulation of aggregate demand. By layering these factors with peak parking ratios, projections of aggregate demand (the number of parked cars at any one time, across all land uses) are the outcome of the shared parking model -- rather than projections that simply sum the peak demand projected for each land use.

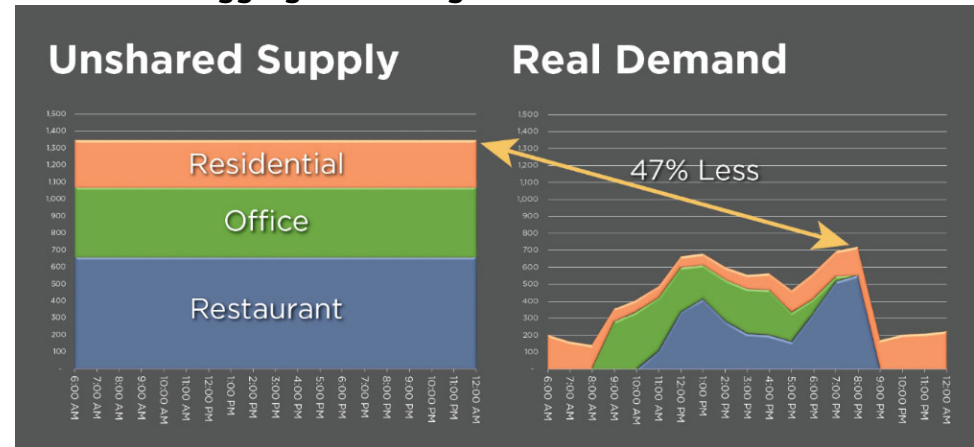
The modeling process is summarized as follows:

1. **Land Use Program:** Categorize and aggregate each TOD site’s uses to determine the built square footage that attracts parking demand.
2. **Model Traditional Parking Demand:** Use ITE parking generation rates to estimate baseline parking demand for the site without any adjustments for local context or temporal variations in demand by land use
3. **Apply Staggered Peaks based on Shared Parking Demand:** Apply a parking model derived from the Urban Land

Institute’s (ULI) Shared Parking Manual to show the expected parking demand throughout the course of an average weekday, adjusted for staggered peaks.

The chart comparison below presents projections for the same land uses. The chart on the left represents a projection that stops at Step 2, as outlined above. The chart on the right represents the model outputs following the critical Step 3 outlined above. As shown, factoring the variation in time-of-day peak/off-peak demand patterns between these land uses allows the model projections to focus on the aggregate supply needs for the project – how many cars will need parking at any given point in time. This indicates real demand in a shared parking scenario is closer to 700 spaces rather than 1,300 spaces.

Additive vs. Aggregate Parking Measures



Considerations

By taking rates from the ITE Parking Generation and the ULI Shared Parking manuals, the basic application of this shared-parking model as part of this TOD Parking Study should be accessible to those who wish to gain insights into shared demand for any development site based on the concept of “staggered peaks.”

However, there are other adjustments which were *not* incorporated into this iteration of the model, but may be worth considering, as they can contribute to an even further reduction in peak shared parking demand estimates.

Mixed-use areas typically experience reductions compared to traditional parking demand assumptions because of staggered peaks but also the concept of “internal capture.” A single parking space that normally serves one land use at a time may serve another land use at the same time simply by the virtue of someone walking to a second destination after parking at their first destination depending on how uses are mixed together and what the walking environment is like between uses. For example, the following groups may make use of only a single parking space where parking generation tables require two spaces:

- Office workers who patronize nearby restaurants at lunchtime
- Hotel guests who attend nearby cultural events
- Residents who own vehicles and park on-site, yet walk to services or to their jobs

Lastly, additional scenarios can be applied to a shared-parking model, which affect the outcome of demand, including the impact of transportation demand management (TDM) and/or trip reduction programs and policies on the site.