understanding the general seasonality of conventions and trade shows.

Employees present at the peak hour on design days range from 1.5 percent to 5 percent;[15] 2.5 percent of the nominal attendance on the design day has been used for this book. With 1.2 persons per car and a small effective supply factor, the recommended ratio for employees is 0.5 spaces/ksf. The overall ratio for convention centers (both exhibition space and meeting rooms) is therefore 6.0 spaces/ksf.

Figure 4-16 presents the seasonality of attendance for all three facilities. One key conclusion is that the seasonality of convention center parking demand will vary and is especially driven by when annual consumer shows are scheduled. If an existing convention center is a key driver of activity in a shared parking analysis, its calendar should be evaluated for seasonality. In the absence of any reliable data, recommended monthly factors based on the seasonality of these three facilities are shown in the graph.

Hotels

Parking Generation has summarized observed parking generation on a per-guest-room basis for five different hotel types. One of the unfortunate limitations of the data, however, is that there are relatively small samples in some subcategories, as well as wide variations in the proportions of guest rooms, restaurants, and meeting/banquet and conference space within each type. As shown in Table 4-15, one of the significant differences noted in the data is that hotels in resort locations had peak parking needs during the daytime on weekdays rather than late at night. Some of the hotels in the full-service category apparently also had peak parking accumulations in the daytime. It is not known, however, whether the ITE data points for those sites were only collected in the daytime, and thus whether the peak hour for each site truly occurred in the daytime.

Land use 310 "hotel" as defined by *Parking Generation* is a full-service establishment with restaurants and cocktail

Table 4-15 Parked Vehicles per Hotel Guest Room

	Hotel (310)	Business (312)		Motels (320)	Resort (330)
	Weekdays	Weekdays	Saturdays	Weekdays	Weekdays
Sites	14	3	3	5	3
Peak Hour	Varies	11 p.m.	Midnight	Varies	Daytime
Range	0.6-1.9	0.57-0.74	0.58-0.75	0.76-1.1	0.95-2.16
85th Percentile	1.14	0.71	0.72	1.02	1.86
Average	0.91	0.6	0.66	0.9	1.42

Source: ITE, *Parking Generation*, 3rd ed.

Table 4-19 Peak-Hour Parking Accumulations at Residential Land Uses (Spaces/Dwelling Unit)

	Single-Family Detached (210)	Rental Townhouse (224)	Condominiums	Low-Rise Apartment (221)		High-Rise Apartment (222)
Location	Suburban	Suburban	Suburban	Suburban	Urban	Urban
Sites	6	3	5	19	12	7
Range	1.3-2.2	1.67-1.82	1.04-1.96	0.68-1.94	0.66-1.43	1.15-1.52
85th Percentile	2.14	1.78	1.68	1.46	1.17	1.52
Average Ratio	1.83	1.73	1.46	1.20	1.00	1.37

Source: ITE, *Parking Generation*, 3rd ed.

Vehicle Ownership at AvalonBay Projects

Parking is a challenging issue for AvalonBay, a developer of urban apartments in high-barrier-to-entry markets. One of the attractions of their locations—in cities such as San Francisco, New York, and Washington, D.C.—is that they are generally well served by public transit. However, while their tenants like being near transit, they also like their cars. A survey of renters at 41 properties found few locations where the average number of vehicles per unit was less than one, and several approached two. When the vehicle ownership was calculated by size of bedroom, the 85th percentile ratio averaged about one parking space per bedroom, which is a standard rule of thumb for residential parking.

The ratios by size of unit were: efficiency apartment, 1.0; one-bedroom apartment, 1.3; two-bedroom apartment, 1.0; and three-bedroom apartment, 0.75.

To create comparable data for different projects with varying mixes of unit size, a synthetic average parking ratio was calculated. This adjusted parking ratio used the average vehicle ownership reported for each unit size at a project and then combined to reflect the same mix of efficiencies and one-, two-, and three-bedroom units as for all developments in the AvalonBay portfolio. A comparison of these adjusted parking ratios for each development found only 14 properties with an average auto ownership of less than one per unit, and only two projects with 0.5 or less—both in major cities. These were urban projects, for which the 85th percentile adjusted ratio was 0.92 vehicles owned, and there was a narrow range. Twelve of the 14 projects had adjusted parking ratios of from 0.71 to 0.94 vehicles per unit. These ratios, which reflect auto ownership only and do not include additional visitor parking, suggest that such urban projects could get by with about one space per unit on average, and a little less in some extreme cases.

The more suburban projects reported adjusted parking ratios from 0.95 to about two per unit. The 85th percentile of these had an average of 1.5 vehicles per unit, which matches the ratio of 1.5, based on Institute of Transportation Engineers data, selected in this book for rental residential uses, at least as far as the residents' own parking needs are concerned. AvalonBay reports that visitor parking at its projects is a scarce commodity, since simply providing sufficient space for residents is a challenge. Decisions about visitor parking need to be part of the management strategy for each developer, and eventually each individual project.

The experiences for this developer must be interpreted within the context of its own management philosophy and market. Its renters are higher-income households willing to pay higher rents for urban locations and able to afford more cars. On the other hand, because parking is also more expensive in such locations, they may forego multiple vehicles or even prefer to get by without a car because of the available alternatives. Determining parking requirements for higher-density residential projects, owned or rented, requires close attention to consumer preferences and market realities.

Lyn Lansdale, vice president for strategic business services at AvalonBay Communities, points out the conflicts for an apartment developer. Many parking programs are designed with the expectation of generating additional income for the owner/developer. However, the ability to charge for parking is site-specific and may depend upon the practices of local competition, customer expectations in the submarket, parking constraints, parking alternatives for renters unwilling to pay, and other considerations. The least desirable situation for both owners and renters is empty parking spaces in a space-constrained property because of residents' unwillingness to pay the parking fees. This type of circumstance exacerbates an already difficult parking situation for the owners and incurs resentment from their customers.