

SENIOR HOUSING TRIP GENERATION AND PARKING DEMAND CHARACTERISTICS

by

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INTRODUCTION

As the baby boomer generation ages, special housing projects have been developed for them in lieu of the traditional single-family home or apartment. Congregate care facilities, independent living apartments, assisted-care units, and senior apartments are being marketed, developed, and built to handle the needs of older adults.

The changing lifestyle of older adults affects their transportation needs and usage as well. Trip generation and parking demand within this age group vary significantly from traditional residential uses because residents no longer have to be at work, pick up their children, or do their shopping at specific times. Also many senior communities provide on-site services to meet their residents' needs. This paper will present the author's experiences with senior housing and its trip and parking characteristics along with data on projects in suburban Chicago, Illinois and around the United States.

SENIOR HOUSING TYPES

Older adults have many special needs that change over time. Many seniors are clearly independent and need little assistance other than help with major chores or repairs. They are generally active and healthy. As time goes by, however, their needs change and grab bars become important, as well as, other features such as higher electrical outlets, emergency response systems, and lower reach cabinets. Good nutrition, socialization, and access to medical and supportive care also becomes more important. Several distinct types of housing have been developed to accommodate these needs:

Senior Single Family Homes are senior-only subdivisions which have been developed for retirees ages 55 and up in the southeast and southwest sections of the United States. These developments typically include recreational facilities. Many of the residents are retired.

Senior Apartments are traditional apartment complexes with a minimum age requirement of 55 years old. Some amenities include recreational facilities, security, and special design features. Residents are independent and may still be working.

Independent Living Units are cottages or apartments where older adults live independently but without the worries of maintenance or housekeeping. Medical care can be available at the facility or by visiting medical staff. A variety of amenities are provided for the residents depending on the size of the community.

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Assisted-Care Units are for older adults having difficulty managing in an independent living arrangement but who do not need nursing home care. Assisted-care is usually apartment living with additional staff to help with normal daily activities.

Congregate Care Facilities contain a full spectrum of housing types in one development with town homes or cottages, independent living units, assisted-care units, and nursing care. Congregate Care Facilities (CCF) allow the elderly to age in one place with nursing care available if they need it. This is particularly important for elderly couples wishing to stay together with one spouse needing special care. CCFs are in essence self-contained communities. **Table 1** lists the amenities that are typically available at a CCF.

Table 1

Typical Congregate Care Facility On-Site Services and Facilities

Standard Services	Extra Services	Common Facilities
<ul style="list-style-type: none"> • Main Meal of the Day • 24-Hour Nursing • Daily Check-In • Weekly Laundry • Utilities • Housecleaning • Organized Programs • In Room Food Service • Bus Shuttle • 24-Hour Security • Complete Maintenance • Free Parking • Garbage Collection • Notary Public Service • Supportive Care Nurse • Chaplain 	<ul style="list-style-type: none"> • Breakfast and Lunch • Extended Room Service • Specialized Diets • Guest Meals • Catering • Physician • Podiatrist • Physical/Speech Therapy • Insurance • Chauffeur Service • Garages • Telephone • Cable TV • Photocopying 	<ul style="list-style-type: none"> • Lounge Area • Dining Room • Library • Chapel • Recreation Room • Country Store • Pharmacy • Arts and Crafts Room • Workshop • Cafe • Exercise Room • Beauty/Barber Shop • Bank Branch Office • Solarium • Whirlpool • Outside Patio • Garden Plots

Source: Milwaukee, Wisconsin CCF Brochure

LITERATURE REVIEW

A review was made of available data on senior trip generation and parking demands. Information was obtained from the Institute of Transportation Engineers Trip and Parking Generation Manuals, the author's files, data from other consultants, as well as, information from California, Arizona, and Florida Departments of Transportation. After reviewing the data, it became clear that the amount of data is small and that the definition of senior housing was not consistent among each source. The data did not distinguish between the five categories mentioned previously.

FACTORS AFFECTING TRIP GENERATION AND PARKING

Several factors affect the trip generation and parking demand at any particular facility. These include the number of dwelling units, nursing beds, average age of residents, resident's affluence, number of employees, and available bus shuttle/chauffeur service. More data needs to be collected in order to properly analyze their relationship to trip generation and parking demand. The trip generation rates for individual facilities varied. Insufficient information on all the survey locations made it difficult to statistically draw conclusions on individual impact of those factors.

However, experience has indicated that as the average age of residents increases, the number of trips and parking demand decreases. This is an obvious affect of the aging process. Nursing beds require more staff to service a patient needs than a more independent resident. When the proportion of nursing beds to residential units increases, the amount of traffic and parking generally increase. The economic well being of residents increases the likelihood that they own a car and thus drive and park. Lastly, bus shuttle/chauffeur service will provide an option to the auto for residents keeping traffic and parking rates lower.

DAILY TRAFFIC GENERATION

Information on daily trip ends was obtained from surveys by the California Department of Transportation (Caltrans) and the Florida and Arizona Departments of Transportation. This data generally categorized the facilities as retirement communities but included CCFs, senior apartment complexes, and may have nursing beds. The author's data consisted of one CCF in Pennsylvania. **Table 2** summarizes the trip data and rates. The average trip rate daily varied between 2.78 and 8.91 trips per unit. The variation in rates supports the conclusion that the number of units/beds is not the only variable influencing trip production. The weighted average trip ends were 4.52 trips per unit which included one large development of 3,122 units. Without the 3,122 unit project, the weighted average rate was 5.64 trips per units.

The weighted daily trip generation rate, was 5.64 trip ends a day for senior housing developments. Senior housing generates two-thirds the amount of traffic compared to a typical single-family development. It's closer to other multi-family categories, including apartments (6.47 trips/unit) and condominiums or townhouses (5.86 trips/units). **Table 3** shows the weekly variation in volumes based on one facility. The weekday volumes were consistent. Weekend traffic volumes were slightly lower.

Table 4 illustrates the hourly distribution of traffic throughout an average weekday, Saturday, and Sunday. The peak-hour volumes of the facility occurred at lunch time and mid-afternoon (2:00 to 4:00 PM). Caltrans data indicated that the peak-hour occurred between 11:00 AM and 4:00 PM, depending on the facility. These peak-hour times do not coincide with the peak-hour of adjacent street traffic because the residents do not have or want to travel during the rush hour. Also, the employee shifts are generally off peak. Most facilities are staffed 24 hours a day with a 7:00 AM-3:00 PM, 3:00 PM -11:00 PM, 11:00 PM-7:00 AM shift schedule. Some administrative staff follow a typical 9:00 AM to 5:00 PM shift.

PEAK-HOUR TRIP GENERATION RATES

Table 5 shows the trip generation rates for eight facilities during the morning and evening peak-hour of the adjacent street system. The weighted average trip rate was 0.222 trips per unit/bed in the morning peak and 0.247 trips per unit/bed in the evening peak. Trip rates ranged from 0.085 to 0.450 per unit. The directional splits were 65% inbound and 35% outbound in the morning and 40% inbound and 60% outbound in the evening. Compared to other residential land-uses, senior developments generate significantly less traffic on a per unit basis.

Table 2

Daily Trip Generation Rates for Senior Housing

Source	Number of Dwelling Units	Daily Trips	Trip Rates
Caltrans	3122	9630	3.09
	300	830	2.78
	108	310	2.87
	76	260	3.42
	460	2252	4.90
Florida DOT	366	3262	8.91
	560	1985	3.55
	187	1449	7.75
	120	901	7.51
	127	561	4.42
Arizona DOT	125	972	7.78
	176	855	4.86
	74	447	6.04
	60	285	4.75
	216	1386	6.42
	175	1058	6.05
	129	941	7.30
	112	922	8.23
	106	820	7.74
	89	538	6.05
	81	529	6.53
	60	494	8.23
	59	432	7.30
Penn. CCF	247	1163	4.71
Weighted Average	7135	32282	4.52
Without 3,122 units	4013	22652	5.64
ITE Average Weekday Daily Rates			
Single-Family (Code 210)			9.55
Apartment (Code 220)			6.47
Condo/townhouse (Code 230)			5.86
Congregate Care Facility (Code 251)			2.15

Table 3

Weekly Volume Distribution

Day of the Week	Percentage
Monday	15%
Tuesday	15%
Wednesday	16%
Thursday	17%
Friday	15%
Saturday	12%
Sunday	10%
Total	100%

Table 4
Hourly Traffic Distribution

Start Hour	Average Weekday	Saturday	Sunday
12:00 AM	1.46%	1.45%	2.76%
1:00 AM	0.07%	0.12%	0.26%
2:00 AM	0%	0.00%	0.26%
3:00 AM	0.12%	0.00%	0.00%
4:00 AM	0.46%	0.00%	0.66%
5:00 AM	0.41%	0.60%	0.39%
6:00 AM	1.94%	2.05%	1.71%
7:00 AM	5.74%	5.06%	3.94%
8:00 AM	6.70%	5.06%	4.99%
9:00 AM	6.19%	5.78%	6.17%
10:00 AM	7.20%	9.40%	7.74%
11:00 AM	9.33%	9.04%	8.53%
12:00 PM	7.05%	8.07%	8.01%
1:00 PM	7.44%	6.27%	4.86%
2:00 PM	9.76%	7.59%	8.40%
3:00 PM	9.54%	10.24%	9.84%
4:00 PM	8.39%	9.40%	9.32%
5:00 PM	5.26%	6.14%	6.96%
6:00 PM	3.14%	3.25%	3.54%
7:00 PM	2.90%	2.89%	4.20%
8:00 PM	2.59%	2.05%	2.49%
9:00 PM	1.10%	1.57%	1.31%
10:00 PM	1.24%	1.33%	1.05%
11:00 PM	1.96%	2.65%	2.62%

Table 5

Peak-Hour Trip Generation Rates

Facility	Location	Occupied Units		Total	AM Peak Volume	Rate	PM Peak Volume
		Dwelling Units	Nursing Beds				
Covenant Village	Northbrook, IL	220	151	371	86	.231	133
Friendship Village	Lombard, IL	620	100	720	86	.120	180
Presbyterian Home	Evanston, IL	312	166	478	92	.193	139
Glenview Terrace	Glenview, IL	243		243			21
Good Shephard Manor	Barrington, IL	102		102	18	.180	17
Mayslake	Oakbrook, IL	630		630	67	.106	75
Leisure Village	New Jersey	200		200	65	.325	62
Pennsylvania CCF		210	37	247	78	.316	111
Totals		2537	454	2991	492		738
Weighted Average Trip Rate					.164		.247
Inbound Percentage					65%		40%
Outbound Percentage					35%		60%
<u>Comparison to other ITE Residential Rates</u>							
Single Family Homes (Land Use Code 26)					0.74		1.01
Apartments (Land Use Code 220)					0.51		0.63
Condominiums/Townhouses (Land Use Code 230)					0.44		0.55

PARKING DEMAND SURVEYS

Parking demand characteristics were obtained from a number of surveys conducted in the Chicago metropolitan area. The peak parking demand occurred during the mid-day between 11:00 AM to 3:00 PM corresponding, in part, with the largest employee shift on-site. **Table 6** summarizes those surveys. The peak day of the year is Mother's Day when many facilities run out of visitor parking, according to the on-site staff.

The peak parking demand rates varied between 0.214 and 0.579 vehicles per unit/bed with a weighted average rate of 0.404 vehicles per unit/bed. Employee, resident, and visitor parking is included. This rate is one third to one half the parking rate of other residential uses. Readers should note that the survey sites with the higher parking rates generally have more nursing beds which requires more employees than the residential units.

Table 6

Peak Parking Demand Surveys

Development	Location	Dwelling Units	Nursing Beds	Total Units/Beds	Peak Parking Rate	Peak Parking Demand
Covenant Village	Northbrook, IL	220	151	371	0.490	182
Beacon Hill	Lombard, IL	235	23	258	0.565	146
Friendship Village	Schaumburg, IL	620	100	720	0.390	281
Presbyterian Home	Evanston, IL	312	166	478	0.579	277
Glenview Terrace	Glenview, IL	243		243	0.214	52
Mayslake	Oakbrook, IL	630		630	0.408	257
<u>EJM Engineering Studies</u>						
Lilac Lodge	Waukegan, IL	203		203	0.315	64
Deerfield Place	Deerfield, IL	98		98	0.230	23
<u>ITE Parking Manual, 2nd Ed</u>						
Retirement Community (Land Use Code 250)		500		500	0.270	135
		3061	440	3501		1417
Weighted Average					0.404	
<u>ITE Parking Manual, 2nd Edition</u>						
Low/Mid-Rise Apartments (Land Use Code 221)					1.21	
High-Rise Apartments (Land Use Code 222)					0.88	
Residential Condominium (Land Use Code 230)					1.11	

Conclusions

Based on the analyses and studies for this paper, the following findings were made:

1. The overall category of senior housing should be broken down into at least five categories for trip generation and parking demand purposes. These categories could be:
 - Senior Single-Family Housing
 - Senior Apartments
 - Independent Living Units
 - Assisted-Care Units
 - Congregate Care Facility
2. Several factors affect the trip generation and parking demand at any particular facility. Any new survey should include the number of dwelling units, nursing beds, average age of residents, resident's affluence, number of employees, and available bus shuttle/chauffeur service. More data needs to be collected in order to properly analyze their relationship to trip generation and parking demand.
3. Daily trip generation rates were found to be 4.52 to 5.64 trip ends a day for senior housing developments. Senior housing generates two-thirds the amount of traffic compared to a typical single-family development. Its daily rates are similar to other multi-family categories, including apartments (6.47 trips/unit) and condominiums/townhouses (5.86 trips/units).
4. Trip generation rates during the peak hour of adjacent street traffic are significantly less because most employees arrive/depart during off-peak periods and residents avoid the peak-hour congestion. The peak hour rates are one-half to one-fourth that of other residential land-uses.
5. The peak-hours of site traffic occurs in the late-morning or early afternoon.
6. The peak parking demand at most senior facilities occurred midday with an average peak demand of 0.40 vehicles per dwelling unit for residents, employees, and visitors. Mother's Day is the highest parking day of the year with many facilities short of spaces for that one day.

References

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6. Arizona Department of Transportation Trip Generation Data