STATISTICAL ANALYSES OF PARKING BY LAND USE

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Two Advisory Committee Members represented and participated from the Institute of Transportation Engineers-New York Upstate Chapter in the Parking Advisory Committee. In addition, members of the New York Upstate Chapter co-sponsored the collection of data for the Committee's first land use of Pharmacies with a drive thru.

Special thanks to the 505 facilities that completed parking survey questionnaires and for granting permission to collect data on their sites. Without permission to conduct the 603 parking lot observations on these sites, this report would not be possible.

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I. INTRODUCTION

STUDY PURPOSE

The purpose of this project was to obtain accurate parking data for analysis to determine parking ratios for various land uses. The parking data and analysis will aid interested municipalities in the evaluation of current parking standards for future development and provide current parking data for developers and consultants.

A result is established for each land use; however these are open to interpretation. The basis for this result is to capture the peak observations recorded in this analysis. Particular attention should be paid to the coefficient of determination (R^2) value for each land use. This value is an important indicator as to how close the relationship is between the variables. The level of confidence of the result should be based on this calculation as well as the number and type of sites included in the analysis.

In establishing a standard for a particular development proposal many factors can be used. The purpose of this report is not to recommend that municipalities change parking standards for each land use. The intent is to provide information which can be used to justify a certain level of parking for a particular development proposal. Other factors associated with a particular proposal may warrant a higher or lower requirement for parking.

OVERVIEW

We are a very automobile-dependent society. This dependence has created a need to provide adequate parking spaces for customers of destination businesses. Sometimes the parking provided is just not enough and competition for available spaces can result in less than safe parking conditions. Other times there are plenty of parking spaces available, many of which rarely, if ever, are used.

Some negative aspects of providing too much parking include increased rate of storm water runoff, increased pollutant loading to local streams, less green space and generally a visually unattractive landscape. Larger than necessary parking areas require more parking lot lights, more complex travel lanes, higher maintenance costs with no specific benefit to the customer or the business.

A site without enough parking can encourage illegal activities such as double-parking, parking in fire lanes, obstructing delivery areas, or discourage customers from patronizing the business.

This publication is intended to assist municipalities, consultants and developers to provide effective, efficient parking ratios for specific land uses. Historically, many municipal parking regulations have been conservative in establishing ratios, resulting in many unnecessary parking spaces. Zoning ordinance references for parking vary from municipality to municipality, with relatively little consistency from one code to the next. Some are based upon square footage of a facility, some based upon number of seats or legal occupancy. Other codes leave parking ratios to the discretion of a ruling board or agency.

This report helps provide a realistic view of actual local parking demands for many common land uses. The analyses included in this report can assist a local municipality that may be dealing with modifications to a local zoning code or revisions to development criteria, by providing a useful range of observed parking space demands collected during peak use of a facility. This report can assist a consultant in advising a client on how much parking to provide. It can also assist a developer in minimizing the cost of installed infrastructure that is not necessary or even help justify a variance or waiver from an outdated code.

This publication was developed with locally collected data in and around Monroe County, New York and is intended to be a resource in evaluating existing codes and ordinances, and can be used in conjunction with other technical resources, such as the Institute of Transportation Engineers' *Parking Generation* manual. It addresses some of the newer and changed land uses that may not be effectively described in some local ordinances, such as pharmacies with drive thru windows and the wide range of senior housing options. It also includes some less standard land uses, such as funeral homes and marinas. There are conventional land uses such as restaurants, office buildings and supermarkets included as well.

It is the hope of Monroe County and the advisory committee responsible for the preparation of this resource, that this will become a tool for local municipalities and the development community to evaluate the needs of land uses for adequate parking.

II. STUDY METHODOLOGY

OVERVIEW

The Parking Advisory Committee was made up of representatives from both the public and private sector. The role of the Parking Advisory Committee was to assist in the development of a process to survey parking areas for various land uses within Monroe County. The land uses chosen by the Parking Advisory Committee were based on a lack of available local data, land use development pressure and a change in land use operation which may have impacted parking utilization, such as the addition of a drive thru. The Committee prepared 27 land use parking survey questionnaires, which were sent out to many facilities for each land use. The majority of the sites included in the study are privately owned. If other travel options for non-drivers existed, such as the Rochester Genesee Regional Transportation Authority's bus line, it is noted within the land use analysis. The questionnaire also requested permission to conduct a parking survey to collect data on each site.

Once permission has been granted, one of three trained Monroe County employees conducted the parking survey on site during average peak time for parking utilization[1]. The survey is conducted in time intervals that are appropriate to capture the parking data and for a duration that includes the rise and decline from the average peak time, which is determined from the questionnaire and multiple site visits.

Once an adequate number of parking surveys have been collected for a land use, the data is entered into a database by Monroe County staff. The data is then examined for inconsistencies and for verification. For example, the building square footage of sites within the study were verified through the Monroe County Real Property database. After the database was verified against the field survey forms and the facility questionnaire forms, it was sent to Warner Transportation Consulting, Inc. with a draft analysis text, a list of parking standards for each municipality within Monroe County and a list of exploratory issues. Warner Transportation Consulting prepared an analysis for each of the 27 land uses which the Advisory Committee was responsible for reviewing and approving for inclusion in this publication.

This report is the culmination of contacting 1,330 facilities, receiving 505 facility questionnaires, conducting over 600 parking surveys for approximately 390 facilities.[2] This report, as well as additional resources, may be found on Monroe County's website: www.monroecounty.gov

[1] Members of the New York Upstate Chapter of ITE co-sponsored the collection of data for the committee's first land use of Pharmacies with a Drive Thru.
[2] See Appendix A for the Summary of Data by Land Use.

QUESTIONNAIRE

The data was collected through the distribution of a letter requesting permission to conduct a parking survey along with an extensive facility questionnaire sent to facilities for each land use[3]. The questionnaires were used to acquire general information and characteristics about the site, which included facility square footage, hours of operation, services provided and peak time for parking utilization[4]. Returned facilities questionnaires were reviewed to determine if the facility met the defined description of the land use to be studied. If portions of the questionnaires were left blank, facility respondents were contacted or the information was verified by a site visit.

PARKING SURVEY COUNTS

The responses from the questionnaires were evaluated to select the appropriate survey day, duration, and time interval to capture the average peak parking demand for each facility[5]. The parking observations were recorded at time intervals that were determined based on information available from the facility questionnaires on how long a person would typically stay at a particular facility. All parking observations were counted at the same time intervals per land use, however the land uses varied in duration.[6]

Detailed instructions were provided to each observer to ensure that the data collection process would be consistent. The parking observers counted and recorded the number of parking spaces being used at the predetermined time intervals on a field observation form. The field observation form also included site information, time, date, and weather conditions as well as questions about how pedestrians used the site.

DATA ANALYSIS

Once an adequate number of parking observations were conducted for a land use, the data was analyzed. To calculate the parking ratio for each land use, the parking count data was plotted on a graph showing the dependent variable (peak number of parked cars per site) and the independent variable (size of building, number of seats, number of residents, etc.). Linear and in some cases non-linear regression analyses were preformed on the data plots and equation graphs. These graphs were created to show the best fit line of the data, the high rate, and the common standard within Monroe County municipalities.

[3] See Appendix B for a Sample Letter mailed to Facility Managers.
[4] See Appendix C for a Sample Facility Questionnaire.
[5] See Appendix D for a Sample Field Observation Form.
[6] See Appendix E for a Summary of Observation Tabulations per Land Use.

The best fit line, derived through a regression analysis, expresses the optimal mathematical relationship. R^2 measures the degree to which the equation accounts for the variation from the average in peak parking spaces occupied. The graphs also include the most common standard found among current parking regulations within Monroe County for the land use being studied. Not all land uses have a common parking standard therefore the common standard is not always shown for each land use chart. The high rate indicates the rate of the highest observed site within the land use. See Section IV – User's Guide to Data Plot and Equations for an explanation of the graphed analysis in each land use and Appendix F – Glossary of Terms for a comprehensive list of terms used in this study.

URBAN, SUBURBAN, RURAL DESIGNATION

All sites analyzed within the study are designated as Urban, Suburban or Rural. This designation is based on village, town or city's density. The densities of municipalities within Monroe County were calculated by dividing housing units per acre for each municipality. The raw data came from the United States Bureau of the Census, Census 2000 Summary File 1 (SF 1) 100–Percent Data. The geographic area defined by the Census Bureau as Monroe County, New York – County Subdivision and Place.

Specifically, housing units per total area for each village, town and city were used to determine densities of Monroe County municipalities. To view this data in addition to demographic data such as area, population, average household size, and housing units please see Appendix H – Monroe County Municipality Data.

Once the densities were computed, each village, town or city was then designated as urban, suburban or rural for the purpose of characterizing the site where a field survey was conducted. Please refer to Appendix G – Urban, Suburban, Rural Designations for specific municipality designation. The intent of providing the density ratios for the urban, suburban, and rural designations is so that any other village, town or city can use their density to see how applicable the data contained in this report is to their municipality. Each land use analysis indicated how many sites were located within each designation. If a town has a density of 0.34 and the land use included in this report had the majority of observations conducted in suburban locations, then the data should be applicable to the municipality.

Each village, town or city is defined by Monroe County municipal boundaries. All average household sizes for each municipality within Monroe County range between 2.14 and 2.86. The United States Census Bureau's American Fact Finder defines housing unit as "a house, an apartment, a mobile home or trailer, or group of rooms, or a single room occupied as separate living quarters, or if vacant, intended for occupancy as separate living quarters. Separate living quarters are those in which the occupants live separately from any other individuals in the building and which have direct access from outside the building or through a common hall. For vacant units, the criteria of separateness and direct access are applied to the intended occupants whenever possible."

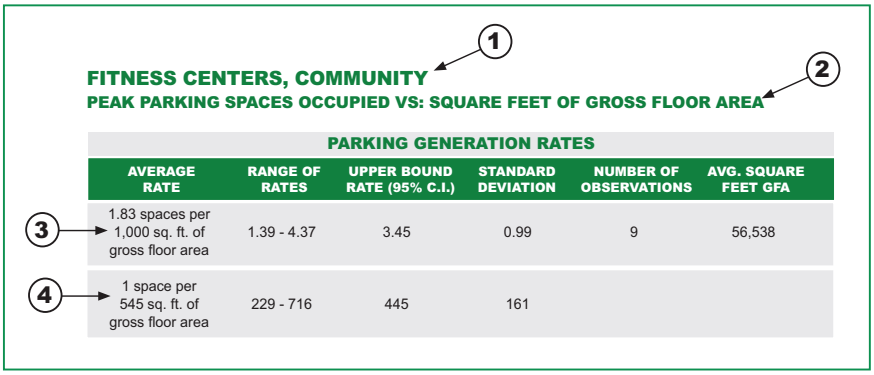
III. SUMMARY OF RESULTS BY LAND USE

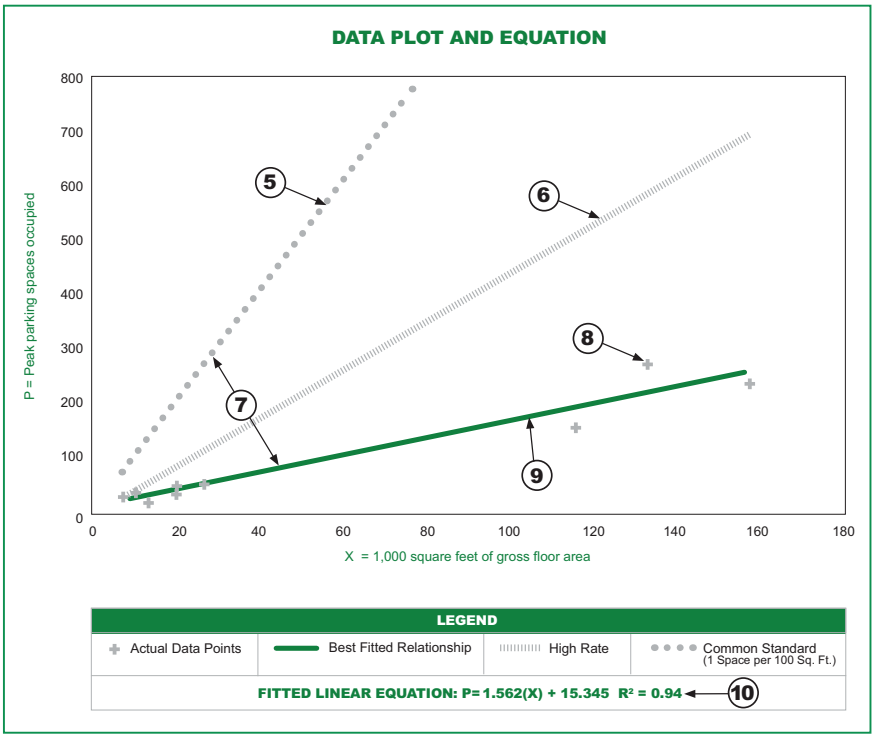
Land Use	Common Standard Used by Monroe County Municipalities	Result
Banking Facilities with a Drive Thru	1 space per 150 sq. ft.	1 space per 155 sq. ft.
Church/Synagogues	1 space per 4 seats or 1 space per 400 sq. ft.	1 space per 4 seats in the sanctuary *(this recommendation pertains to the use of the facility as a place of worship and does not include other potential ancillary uses)*
Convenience Stores	1 space per 200 sq. ft.	Fixed number of 12 spaces
Convenience Stores with Gas Stations	1 space per 200 sq. ft.	Sufficient spaces for vehicles filling up at each fuel pump; 12 spaces away from the pumps for gas stations with walk-in convenience stores; 2 added spaces per garage bay; and, added spaces for fast food operations with seating areas for patrons eating-in
Day Cares	1 space per 6 enrolled children	1 space per 4.5 enrolled children
Donut Coffee Bagel Shops with a Drive Thru	No common standard; fast food most similar of 1 space per 100 sq. ft.	Fixed number of 25 spaces for shops with 1,500 sq. ft. – 4,500 sq. ft.
Donut Coffee Bagel Shops without a Drive Thru	No common standard; fast food most similar of 1 space per 100 sq. ft.	Fixed number of 35 spaces for shops with 1,500 sq. ft. – 4,000 sq. ft.
Family Restaurants, Menu	1 space per 100 sq. ft. or 1 space per 2 seats	1 space per 2 seats or 1 space per 50 sq. ft.
Family Restaurants, Menu Board	1 space per 100 sq. ft. or 1 space per 2 seats	1 space per 2 seats, up to a maximum of 80 spaces or <8,000 sq. ft. = 1 space per 80 sq. ft.
Fast Food Restaurants with a Drive Thru	1 space per 100 sq. ft.	1 space per 120 sq. ft., up to a maximum of 32 spaces
Fitness Centers, Adult	1 space per 100 sq. ft.	1 space per 140 sq. ft.
Fitness Centers, Community	1 space per 100 sq. ft.	<50,000 sq. ft.=1 space per 400 sq. ft. >50,000 sq. ft =1 space per 667 sq. ft.
Funeral Homes	1 space per 50 sq. ft.	1 space per 50 sq. ft.
Home Improvement Stores	1 space per 200 sq. ft.	50,000 sq. ft. - 130,000 sq. ft. = Fixed number of 200 spaces

Land Use	Common Standard Used by Monroe County Municipalities	Result
Hotels	1 space per room	1 space per 0.8 rentable hotel guest room
Industrial Facilities	1 space per employee or 1 space per 400 GFA	1 space per 1.11 peak shift employee or 1 space per 600 sq. ft. of GFA, whichever is greater
Marina Facilities	1 space per boat slip	.7 space per boat slip
Office Buildings, General	1 space per 250 sq. ft.	1 space per 200 sq. ft. for the first 20,000 sq. ft., plus 1 space per 450 sq. ft. for any additional square footage over 20,000 sq. ft.
Office, Medical/Dental	1 space per 200 GFA	1 space per 270 GFA
Office Parks	1 space per 250 sq. ft.	1 space per 400 sq. ft.
Pharmacies with a Drive Thru	No common standard; basic retail most similar of 1 space per 200 sq. ft.	1 space per 300 sq. ft. or a maximum of 30 spaces up to 15,000 sq. ft
Senior Housing, Continuing Care Retirement Communities	No common standard	1 space per 2 residents
Senior Housing, Nursing Homes	No common standard	1 space per 1.5 residents
Senior Housing, Senior Citizen Residential Communities	No common standard	1 space per 1.7 residents
Senior Housing, Senior Living and Care Facilities	No common standard	1 space per 2.3 residents
Shopping Centers	1 space per 200 sq. ft.	1 space per 200 sq. ft.
Supermarkets	1 space per 200 sq. ft.	<30,000 sq. ft=1 space per 200 sq. ft; 30,000 - 60,000 sq. ft. = 150 spaces plus 1 space per 300 sq. ft.; 60,000 - 90,000 sq. ft. = 250 spaces plus 1 space per 400 sq. ft.; > 90,000 sq. ft. = 325 spaces plus 1 space per 500 sq. ft.

IV. USER'S GUIDE TO DATA PLOT AND EQUATION

See Appendix F for a Glossary of Terms





1. Title of Land Use Analyzed.
2. The dependent and independent variables used in analyzing this land use.
3. Average Rate of Peak Parking Space Occupied per No. of Seats in a format used Nationally (X spaces per 1000 sq. ft.).
4. Average Rate of Peak Parking Space Occupied based on Gross Floor Areas (1 space per X sq. ft.).
5. Most common standard for a land use in Monroe County municipalities
6. Highest parking rate among the observed sites
7. Distance between what most municipalities require for minimum number of parking spaces compared to the average number of peak parking spaces that were actually occupied
8. Each square represents one observed site.
9. This line represents the best fitted relationship or the best association between the variables studies (in this case, sq. ft. and peak parking spaces).
10. The closer R^2 is to 1.0, the better the association is between the two variables.

FITNESS CENTERS, COMMUNITY

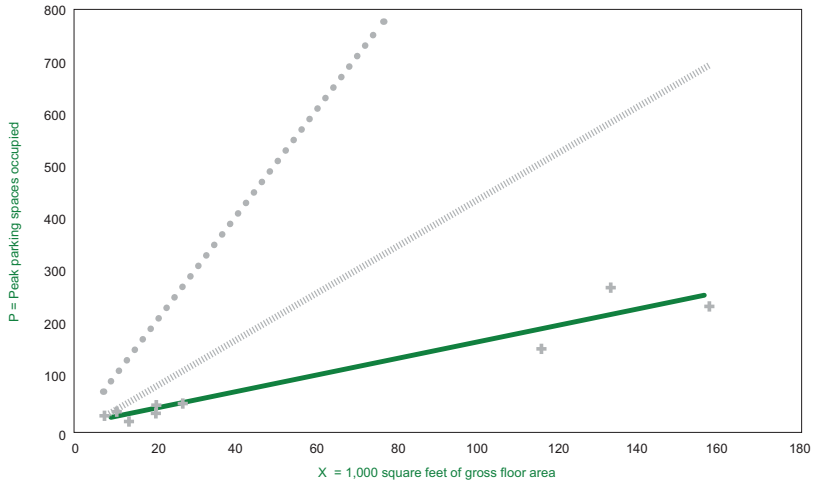
PEAK PARKING SPACES OCCUPIED VS: SQUARE FEET OF GROSS FLOOR AREA

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. SQUARE FEET GFA
1.83 spaces per 1,000 sq. ft. of gross floor area	1.39 - 4.37	3.45	0.99	9	56,538
1 space per 545 sq. ft. of gross floor area	229 - 716	445	161		

11 12 13 14 15 16

DATA PLOT AND EQUATION



LEGEND			
Actual Data Points	Best Fitted Relationship	High Rate	Common Standard (1 Space per 100 Sq. Ft.)

17 → FITTED LINEAR EQUATION: P= 1.562(X) + 15.345 R^2 = 0.94

11. Parking generation rate that is the average number of occupied parking spaces per one unit of the independent variable (in this case, sq. ft.).
12. The range between the largest sample observed and the smallest sample observed.
13. The probable upper bound of the average for this land use. The sample may not be representative of all facilities in this land use. Assuming a random sample of sites, however, we can be 95 percent confident that the true average rate is below this level.
14. The lower the standard deviation the less dispersion there is between the data and therefore the better the data fit.
15. Number of sites observed for this land use.
16. The average square footage of the sites observed.
17. Expresses the optimal mathematical relationship between two or more related variables (in this case peak parking and sq. ft.).

V. LAND USE DESCRIPTIONS AND ANALYSIS

SUMMARY OF LAND USE DESCRIPTIONS

Land Use	Description
Banking Facilities with a Drive Thru	The facilities in this land use category provide retail banking services. All of the facilities used in this report had automated teller machines (ATMs) and drive thru facilities.
Church/Synagogues	Church or synagogue facilities are places of public worship. Examples of some of the services provided by the facilities included in this analysis are bible studies, clubs, banquet rooms, day care and community centers.
Convenience Stores	Convenience store facilities are retail stores that generally contain less than 8,000 square feet of gross floor area (GFA) that is designed and stocked to sell primarily food, beverages, and other household supplies to customers. Most of these facilities also served fast food. They are designed to attract a large volume of stop-and-go traffic. The convenience stores included in this land use did not sell fuel for vehicles.
Convenience Stores with Gas Stations	Convenience stores with gas stations are retail facilities that sell automotive fuels and may have service bays for vehicle maintenance and repairs. As a clearly secondary activity, they have space devoted to the sale of convenience items (such as food, tobacco, periodicals, and other small household products).
Day Care	Day Care facilities provide for the care of minor children on a somewhat regular basis. The period of care is generally less than 12 hours per day. The minor children are cared for in a facility other than the child's home. These facilities may be operated by a person, society, agency, corporation, institution, or any other group that is licensed by the state. Day Care facilities may be operated in conjunction with a business, school, religious facility or as an independent commercial enterprise with or without academic instruction. The facilities included in this analysis provided a variety of full time and part time care options.
Donut, Coffee and Bagel Shops with a Drive Thru	Donut, coffee and bagel shops with a drive thru are informal restaurants offering primarily donuts, coffee and bagels where customers order by means of a walk-up counter, or window designed to accommodate automobile traffic. Generally eating areas are provided and consumption may be either on or off the premises.
Donut, Coffee and Bagel Shops without a Drive Thru	Donut, coffee and bagel shops without a drive thru are informal restaurants offering primarily donuts, coffee and bagels where customers order and/or service may be by means of a walk-up counter. Accommodations are not provided for drive thru automobile traffic. Generally eating areas are provided and consumption may be either on or off the premises.

Land Use	Description
Family Restaurants, Menu Board	Menu Board Family Restaurants serve food and beverages excluding alcohol on demand from a menu board near the order counter to be consumed while seated at booths or tables or can be consumed off premises.
Fast Food Restaurants with a Drive Thru	Fast Food Restaurants with a Drive Thru are all part of a national chain where customers order by means of a window designed for automobile traffic or by means of a walk up counter. For patrons opting to order by means of the walk up counter, there is an eating area for those who choose to eat at the facility.
Fitness Centers, Adult	Adult fitness centers are privately owned membership facilities for adults and used for body conditioning and physical exercise.
Fitness Centers, Community	Community fitness centers are private membership facilities or not-for-profit membership facilities used for athletic and general recreation activities for adults and children.
Funeral Homes	Funeral Homes are facilities used for preparation of the deceased for viewing, memorial services, burial or cremation and in some cases reception areas.
Home Improvement Stores	Home improvement stores engage in the retail sale of lumber and a wide variety of materials related to home maintenance, repair, and remodeling. This includes various basic hardware lines, such as tools, construction hardware, along with home appliances, paint, fixtures, and garden supplies. These stores offer how to advice, contractor services, delivery, design services, and installation services. Lumber and/or garden supplies may be stored in the main building or in a yard or an adjacent storage shed.
Hotels	Hotel facilities provide transient sleeping accommodations with associated lodging services for a fee.
Industrial Facilities	Industrial facilities are involved in one or more of the following activities: manufacturing, designing, assembling, and/or converting a raw material into a finished product or processing a product. More than three quarters of the sites used in the survey were manufacturing facilities.
Marina Facilities	Marina facilities are privately owned membership and non-membership facilities located on the waterfront primarily used for storing boats both on water and on land. This land use includes commercial marinas as well as private yacht clubs. Of the facilities used in this analysis, 4 included boat dealerships, three had small boat supply and gift shops and three sold fishing bait and tackle.

Land Use	Description
Office, Medical/Dental	Medical and dental offices are facilities operated by one or more physicians, dentists, or medical related companies for the examination and treatment of patients on an outpatient basis.
Office Parks	A group of freestanding office buildings used as offices for a profession, service, or industry that has been planned, developed and operated under one common ownership or management whether or not located on the same lot, having one common arrangement for the maintenance of the grounds, share parking areas and is referred to under one common name. Of the sites included in the analysis most were professional offices. Approximately half of the sites had commercial, retail, or medical components.
Pharmacies with a Drive Thru	Pharmacies are retail facilities that primarily sell prescription and over-the-counter medicine and associated products by means of a walk up counter or window designated to accommodate automobile traffic. The facilities also usually sell cosmetics, toiletries, stationary, personal care products, limited food products, film development and general merchandise. The drug stores in this category contain drive-through windows.
Senior Housing, Continuing Care Retirement Communities	Continuing Care Retirement Communities are age restricted complexes include many housing forms, including detached and attached dwelling units, apartments, and residences, offering private and semiprivate rooms and a variety of levels of service to residents. The range of services provided include nursing home, adult day care, memory impaired, assisted living, and senior living. They offer social activities, congregate meals, supportive assistance, and personal care on one campus. Residents pay separately for housing, activities, meals, services and nursing care as needed or desired.
Senior Housing, Nursing Homes	A nursing home is any facility whose primary function is to care for persons who are unable to care for themselves, for example rest homes (which are primarily for the aged), chronic care and convalescent homes. Traffic is primarily generated by employees, visitors and deliveries.
Senior Housing, Senior Citizen Residential Communities	Senior Citizen Residential Communities include facilities which are included in the nursing homes, senior living and care facilities, and continuing care retirement communities land uses. These are facilities which provide residential units and which also may offer or provide services, supervision and care to senior citizens who may not be able to live independently; or in the case of a nursing home, persons who, by reason of chronic or long-term illness, regardless of age, may not be able to live independently. This study excludes senior housing developments and retirement communities which are based on age rather than need.

Land Use	Description
Shopping Centers	Shopping centers are a group of commercial businesses offering a range of retail goods and services with an aggregate gross floor area greater than 25,000 square feet that is designed as a single commercial group, whether or not located on the same lot. The group is under common ownership or management, or has a common arrangement for the maintenance of the grounds. There is generally a shared parking area, and a single name for the complex.
Supermarkets	Supermarkets are retail establishments primarily selling food, as well as other convenience and household merchandise. The majority of the floor area is devoted to perishable and non-perishable food items for preparation and consumption off premises. The majority of the sites included in the survey had at least one other non food related section within the store such as cards, flowers, seasonal merchandise, pharmacy and food for consumption on site.

V-1. BANKING FACILITIES WITH A DRIVE THRU

LAND USE DESCRIPTION

The facilities in this land use category provide retail banking services. All of the facilities used in this report had automated teller machines (ATMs) and drive thru facilities.

FACILITY INFORMATION

The 11 facilities surveyed ranged in size from 2,500 square feet to 4,390 square feet. Eight of the facilities were located in freestanding buildings and three were part of a larger shopping center. In all cases, the parking area for bank patrons and employees could be isolated from parking spaces used by other businesses. Ten sites surveyed had public transit available within a quarter mile.

PARKING SURVEY INFORMATION

Of the 11 facilities examined, one was in an urban location and ten were in suburban locations.

The banking facilities were surveyed in 2003 in Monroe County, New York. In most cases the peak parking demand occurred during the lunch hour between 11:15 a.m. and 12:45 p.m., Friday and Saturday and 2:00 p.m. to 4:00 p.m. Thursday and Friday. Saturday parking lot counts did not yield a significantly higher demand than weekdays.

FACILITY OBSERVATIONS

Four participating facilities commented that the maintenance of the parking area is an area of concern for their facility. The maintenance areas of concern were potholes, snow removal and snow storage.

One parking observer noted a confusing traffic pattern due to very faded painted striping. Due to the extremely light lines non-handicap motorists were parking in handicap spaces. The drive thru at one site crossed in front of the entrance into the building causing an unsafe condition.

STATISTICAL ANALYSIS

The Data Plot and Equation chart shows the peak occupied parking spaces relative to the square footage of the respective bank with a drive thru. The chart also shows a best fit curve to match the data, a high rate for the sample, and a common standard used by Monroe County municipalities.

The best fit curve for the weekday data is a simple linear relationship of 3.4 spaces plus 3.6 spaces per every 1,000 square feet. Square footage is not an ideal measure as evident by the goodness of fit measurement (R^2) of 0.23. A measurement of 1.0 would indicate a perfect linear relationship between the square footage and banking facilities with a drive thru's peak parking demand.

The chart also shows a 1 space per 150 square foot parking standard, which is close to the mid-range of codes identified for this land use among Monroe County cities and towns. Most municipalities in the county do not have a distinct parking code for banks, while others apply a standard based on facility size and the number of employees.

VARIABLES EXAMINED

Variables examined included an assessment of peak parking spaces occupied as a function of the reported number of employees with or without the second predictive variable of facility size. Accounting for employees did not lead to a better model, although this may relate to measurement error as the reported rates appeared in many cases to be rough generalizations.

The number of drive thru windows was also tested as a useful variable. More drive thru lanes might reduce the demand for parking at a bank. The few sites in the larger sample without drive thru were left out of the analysis, however, and tests of 1, 2, or 3 drive thru lanes did not have a statistically significant effect.

The preponderance of the sample in suburban settings prevented the inclusion of urban, suburban, or rural contexts among the variables tested. The estimation of the best fit curve did include tests of various functional forms and data transformations, but none of these transformations provided an appreciably better fit to the data than did the linear relationship.

CONCLUSIONS

The peak rate of occupied spaces does relate to the size of the bank, and the sample shows a high rate of 1 occupied space per 155 square feet of the facility. This is close to the common standard of 1 space per 150 square feet, and it suggests that this rate would be reasonable to avoid overflow parking from bank customers and employees.

Common Standard:	1 space per 150 sq. ft.
Survey Result:	1 space per 155 sq. ft.

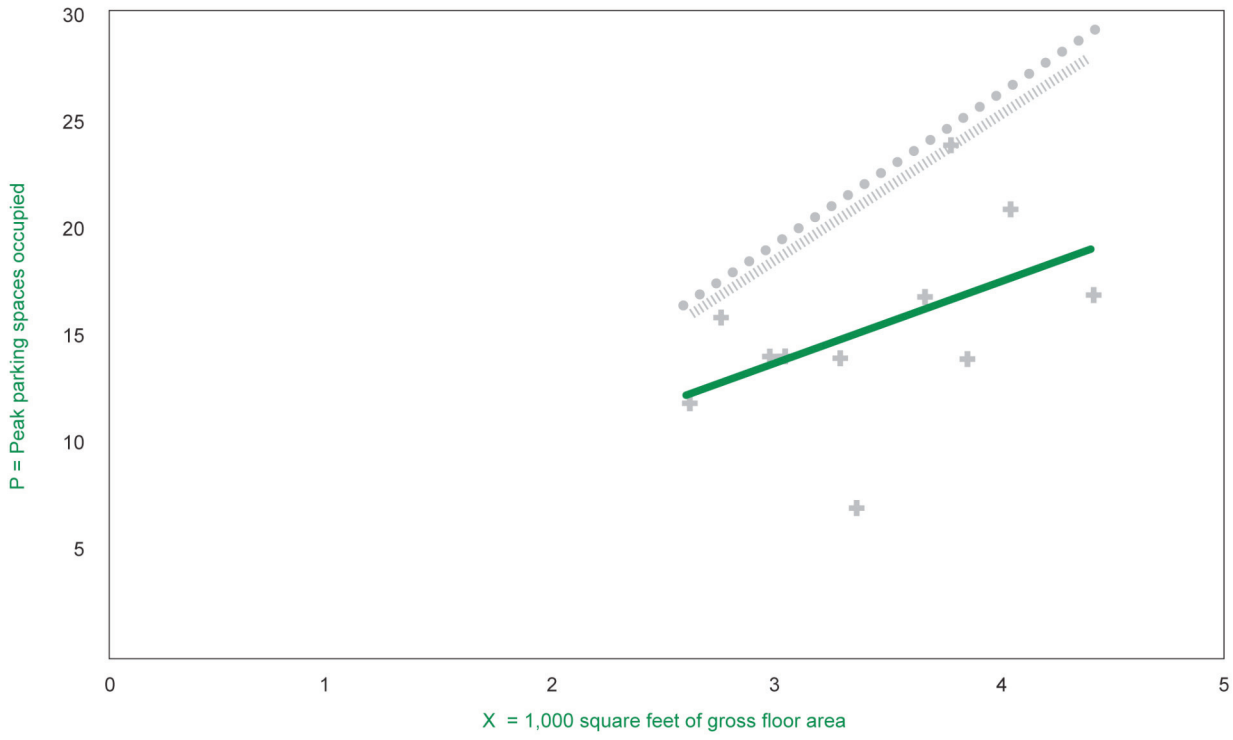
BANKING FACILITIES WITH A DRIVE THRU

PEAK PARKING SPACES OCCUPIED VS: GROSS SQUARE FOOTAGE OF FACILITY

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. SQUARE FEET GFA
4.60 spaces per 1,000 sq. ft. of gross floor area	2.13-6.44	5.24	1.17	11	3,359
1 space per 217.3 sq. ft. of gross floor area	155.3 - 468.9	170.8	85.2		

DATA PLOT AND EQUATION



LEGEND			
Actual Data Points	Best Fitted Relationship	High Rate	Common Standard (1 Space per 150 Sq. Ft.)

FITTED CURVE EQUATION: P=3.594(X) + 3.383 R^2 = 0.23

V-2. CHURCH/SYNAGOGUES

LAND USE DESCRIPTION

Church or synagogue facilities are places of public worship. Examples of some of the services provided by the facilities included in this analysis are bible studies, clubs, banquet rooms, day care and community centers.

FACILITY INFORMATION

The 24 facilities surveyed ranged in size from 2,324 square feet to 114,195 square feet, have worship seating capacity ranging from 120 to 1,200 people, and have registered parishioners (active and inactive) ranging from 39 to 1,900 families.

Twenty-one sites surveyed had public transit available within a quarter mile, which employees or patrons could use.

PARKING SURVEY INFORMATION

Of the 24 facilities examined 14 were in a suburban locations, eight were in urban locations and two were in rural locations.

Several of the churches have parochial schools on the immediate property; the space for these schools was not included in the reported square footage or used in the statistical analyses.

The church and synagogue facilities were surveyed in 2004 in Monroe County, New York. Parking survey observations were taken during worship service hours only. Surveys were not conducted during special events or special religious holidays. In all cases the peak parking demand occurred for synagogues on Saturdays between 9:30 a.m. and 11:30 a.m. Peak parking demands occurred for churches on Saturdays between 4:30 p.m. and 6:15 p.m. and on Sundays between 8:40 a.m. and 11:15 a.m.

FACILITY OBSERVATION

Comments from facility questionnaires for church and synagogue facilities revealed that two facilities described a general shortage of parking while two others described a shortage of parking only during special events or religious holidays. Three other facilities commented that there was room for overflow parking nearby. Other issues such as unauthorized cars parked in the lot, abandoned cars left in the lot, and snow removal were all concerns described. Five of the twenty-four sites observed had parking spaces covered with snow, which made organized parking difficult for patrons.

Parking observers noted that five of the twenty-four sites were not striped.

STATISTICAL ANALYSIS

The Data Plot and Equation charts show the peak observed occupied parking spaces relative to the respective facility's number of seats and square footage. The number of seats has a much stronger relationship to the observed parking demand. This is obvious from the relative closeness of the data points to the best fit line. It is also evident in the statistical measures; the best fit line for the seats chart has an R^2 of 0.62, while that for the square footage is only .03. (A perfect relationship would have an R^2 of 1.0.) It should be noted that only 20 facilities were included in the chart showing the peak observed spaces relative to the respective facility's number of seats due to a limited amount of information on the remaining four facilities.

The chart for parking demand as a function of seating includes a line showing a one parking space per four seats standard. This is the most common standard found among current parking regulations for churches and synagogues in Monroe County. The common standard is close to the average rate for the sample (one space per 4.41 seats), but well below the high rate observed (one space per 2.05 seats-shown on the chart). A total of six of the 20 observed facilities have parking rates above the one space per four seat standard.

VARIABLES EXAMINED

Variables examined included tests of various functional forms of the number of seats and square footage, but did not otherwise introduce new variables into the equations.

CONCLUSIONS

Weekend services are the main use of a church or synagogue, and the parking counts for this study took place while these services were underway. In most cases, the parking demand comes close to the common standard of one parking space per four seats in the sanctuary. The churches and synagogues, however, serve other functions besides the regular services. Many of the facilities have large banquet halls for special events, additional halls for smaller meetings or concerts, and other rooms for club meetings, day care, religious education, and choir practice. Some also have large reception rooms that can open to the main sanctuary for the full congregation that arrives a few times a year for the major religious holidays. These additional rooms may not have permanent seats that would be part of the seating counts, but they would add greatly to the facility's total square footage while generating no added parking demand during the regular weekend service. This accounts for the very poor relationship between the observed parking spaces used and the total size of the church or synagogue.

Parking demand would tend to be much higher during special events when the added rooms and halls are in use. During these times, we would expect to see more of a relationship between the square footage and the parking demand.

Municipalities should consider the frequency of events such as weddings, funerals and major holidays when planning parking demand for churches and synagogues. Consideration should be given to the frequency that parking demand would spillover into adjoining properties and streets and the ability of these properties and streets to absorb this demand. The municipality may wish to include a second provision to account for the facilities square footage or maximum occupancy.

Common Standard:	1 space per 4 seats or 1 space per 400 sq. ft.
Survey Result:	1 space per 4 seats in the sanctuary (this result pertains to the use of the facility as a place of worship and does not include other potential ancillary uses)

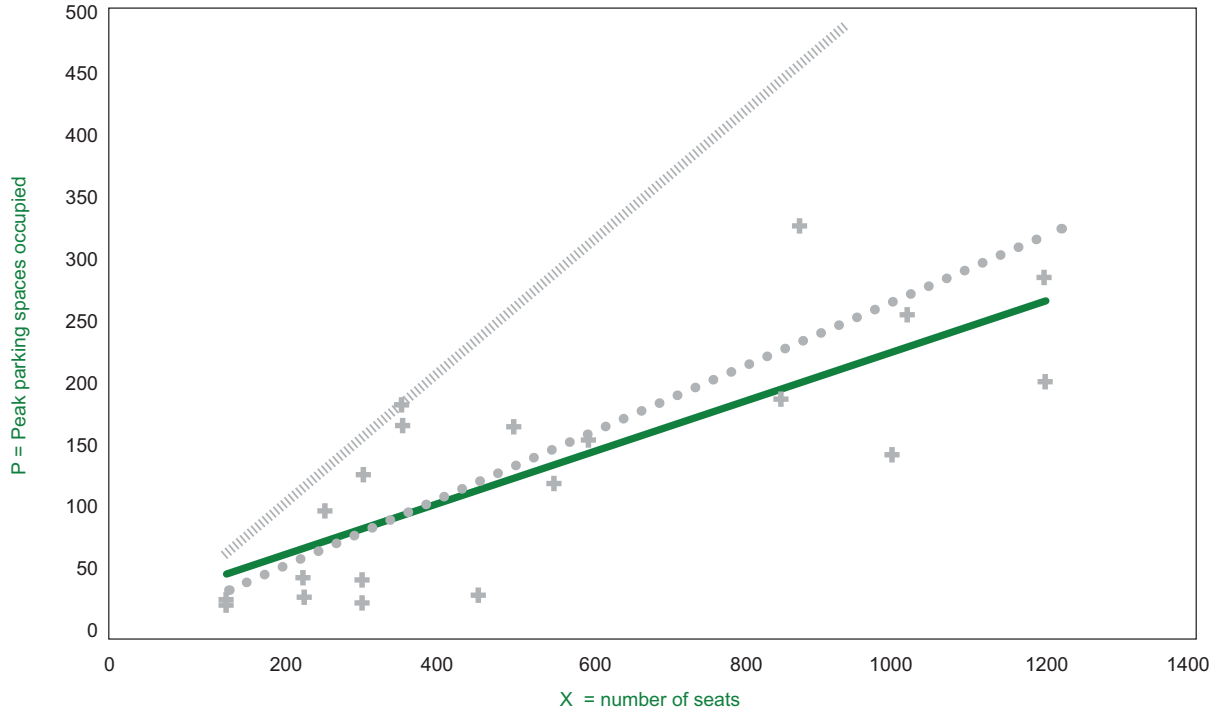
CHURCH/SYNAGOGUES

PEAK PARKING SPACES OCCUPIED VS: NUMBER OF SEATS

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. NUMBER OF SEATS
.23 parking spaces per seat	.06-.49	.27	.12	20	538
1 parking space per 4.41 seats	17.31-2.05	3.65	8.16		

DATA PLOT AND EQUATION



LEGEND			
Actual Data Points	Best Fitted Relationship	High Rate	Common Standard (1 Space per 4 Seats)

FITTED LINEAR EQUATION: P=0.194(X) + 17.501 R^2 = 0.62

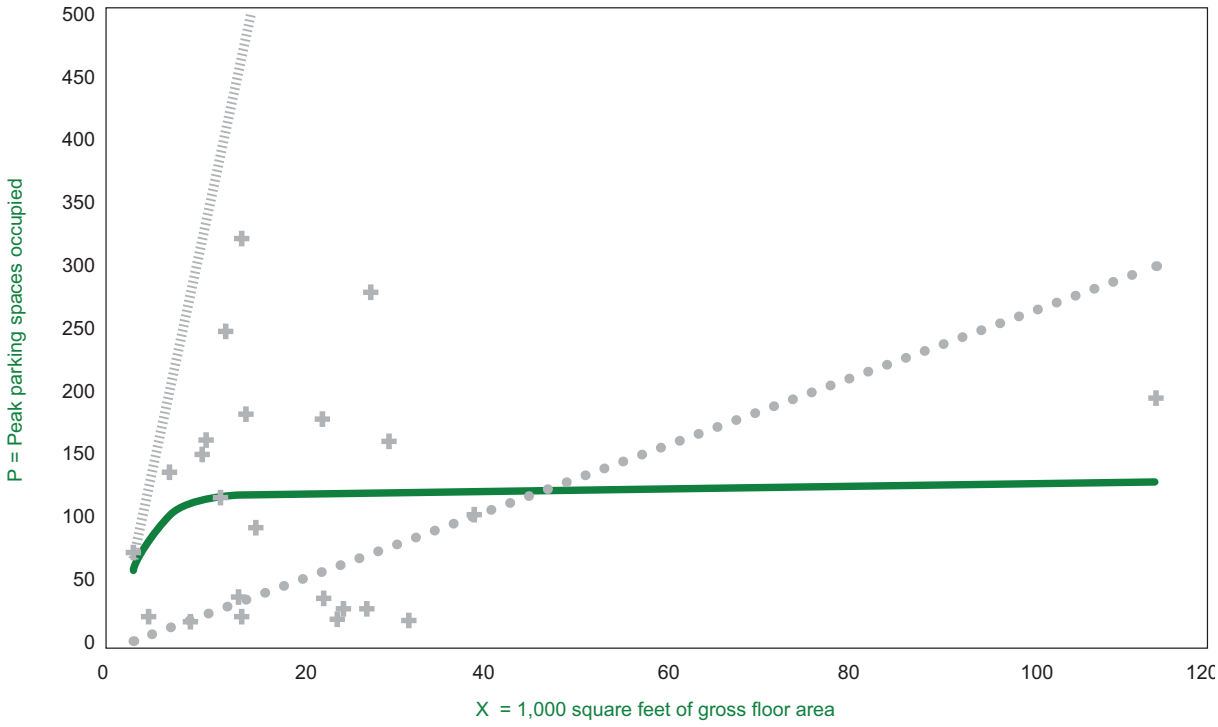
CHURCH/SYNAGOGUES

PEAK PARKING SPACES OCCUPIED VS: SQUARE FOOTAGE

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. SQUARE FEET GFA
5.07 spaces per 1,000 sq. ft. of gross floor area	.61 - 30.98	8.07	8.39	23	21,850
1 space per 197 sq. ft. of gross floor area	1,630 - 32	124	413		

DATA PLOT AND EQUATION



LEGEND			
Actual Data Points	Best Fitted Relationship	High Rate	Common Standard (1 Space per 400 Sq. Ft.)

FITTED CURVE EQUATION: P=125.369 - 162.867(X) + 17.501 R^2 = 0.03

V-3. CONVENIENCE STORES

LAND USE DESCRIPTION

Convenience store facilities are retail stores that generally contain less than 8,000 square feet of gross floor area (GFA) that is designed and stocked to sell primarily food, beverages, and other household supplies to customers. Most of these facilities also served fast food. They are designed to attract a large volume of stop-and-go traffic. The convenience stores included in this land use did not sell fuel for vehicles.

FACILITY INFORMATION

The 11 convenience store facilities surveyed ranged in size from 1,917 square feet to 7,700 square feet. Five sites were freestanding buildings and 6 were part of a small shopping center.

Ten of the sites surveyed had public transit available within a quarter mile, which employees and patrons could use.

PARKING SURVEY INFORMATION

Of the 11 facilities examined, 2 were in an urban location, 9 were in a suburban location and no facilities were in a rural location.

The convenience stores were surveyed between the years of 2002 and 2004 in Monroe County, New York. In all cases the peak parking demand occurred in the morning between 7:15 a.m. and 9:30 a.m. and in the evening between 4:15 p.m. and 6:00 p.m. on a weekday.

Morning and evenings generated similar peak parking demands while no weekday had higher peak parking demand than any other. Weekend observations were deemed inappropriate based on facility questionnaires completed by facility owners and/or managers.

FACILITY OBSERVATION

Facility managers and/or owners did not express many concerns on facility questionnaires. Parking lot observation revealed 7 of the 11 facilities had cars parked in the fire lane or outside the striped parking area. One store had a two-lane loop to accommodate customers who did not have time to park their vehicle. The loop permitted customers to pull up in front of the store and keep their car running while they quickly made their purchase. This allowed for quick turn over for customers which could be very effective with the right site design and traffic flow.

Parking observers noted that on average, customers were inside the convenience store from 1.5 to 3 minutes.

STATISTICAL ANALYSIS

The Data Plot and Equation chart shows the peak observed occupied parking spaces relative to the gross square footage of each facility. The chart includes a best fit linear relationship to the data, as well as lines showing the high rate of parking demand and a common standard, 1 space per 200 square feet now used by Monroe County municipalities for general retail establishments.

The observations and best fit equation fall close to a horizontal line, indicating that size of a convenience store has no significant effect on peak parking demand. This is also reflected in the statistical measures. The best fit line has an R^2 of 0.001 while a perfect relationship would have an R^2 of 1.0.

VARIABLES EXAMINED

Variables examined included whether the convenience store was part of a national chain or if its location was in a plaza or a freestanding structure. These variables were not significant. Some of the convenience stores did offer fast food services. This too was not a significant determinant of peak parking demand. Whether the fast food offering was for dining-in or for take-out was not accounted for in the analysis.

CONCLUSIONS

Variety and quantity of merchandise is limited in convenience stores due to the limited square footage of the facility. Therefore, customers tend to patronize the establishment for a very short period of time. These factors combine to limit the build-up of simultaneously parked cars.

The data suggests that parking for convenience stores should not be a factor of the building's square footage, but rather presented as a fixed number of spaces; 12 spaces would meet all the peak demand observed in the sample. Policymakers and planners should also recognize that some convenience stores may have other activities that generate added parking demand. Fast food operations *with seating areas* (as opposed to strictly take-out) will add demand and add to the average parking duration. These will increase the peak parking requirements beyond the level found for convenience stores alone.

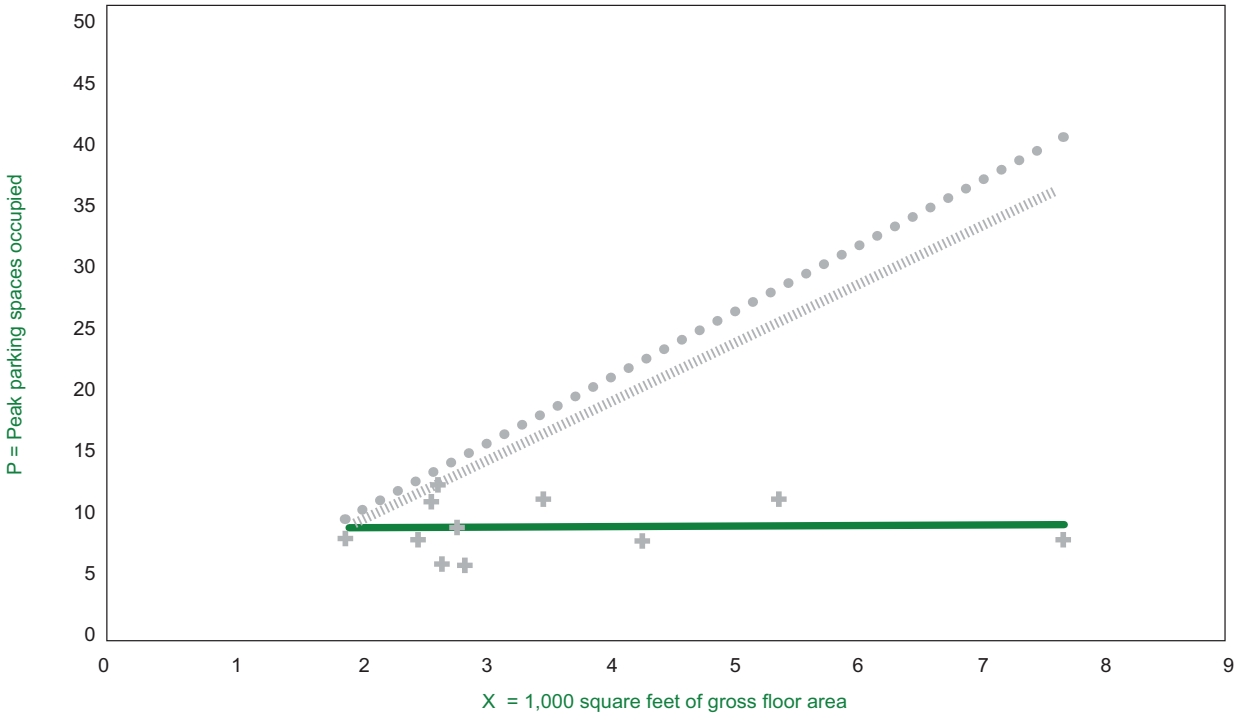
Common Standard:	1 space per 200 sq. ft.
Survey Result:	Fixed number of 12 spaces

CONVENIENCE STORES (WITHOUT AUTOMOBILE SERVICES)
PEAK PARKING SPACES OCCUPIED VS: SQUARE FOOTAGE

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. SQUARE FEET GFA
2.52 spaces per 1,000 sq. ft. of gross floor area	1.04 - 4.53	3.13	1.13	11	3,542
1 space per 397.6 sq. ft. of gross floor area	220.8 - 962.5	280.6	214.0		

DATA PLOT AND EQUATION



LEGEND			
Actual Data Points	Best Fitted Relationship	High Rate	Common Standard (1 Space per 200 Sq. Ft.)

FITTED LINEAR EQUATION: P=0.046(X) + 8.745 R^2 = 0.001

V-4. CONVENIENCE STORES WITH GAS STATIONS

DESCRIPTION

Convenience stores with gas stations are retail facilities that sell automotive fuels and may have service bays for vehicle maintenance and repairs. As a clearly secondary activity, they have space devoted to the sale of convenience items (such as food, tobacco, periodicals, and other small household products).

FACILITY INFORMATION

The 17 convenience stores with gas stations surveyed ranged in size from 912 square feet to 3,200 square feet. All 17 sites were freestanding buildings. Four of sites the were out parcels to a shopping plaza.

Fifteen sites surveyed had public transit available within a quarter mile, which employees and patrons could use.

PARKING SURVEY INFORMATION

Of the 17 facilities examined, 2 were in an urban location, 15 were in a suburban location and no facilities were in a rural location.

The convenience stores with gas stations were surveyed between the years of 2002 and 2004 in Monroe County, New York. In most cases the peak parking demand occurred in the morning between 6:45 a.m. and 10:00 a.m. and in the evening between 3:15 p.m. and 4:45 p.m. on a weekday.

Morning and evenings generated similar peak parking demands while no weekday had higher peak parking demand than any other. Weekend observations were deemed inappropriate based on facility questionnaires completed by facility owners and/or managers.

FACILITY OBSERVATION

Facility managers and/or owners expressed concerns about congestion, patrons parking in no-parking designated areas and the importance of traffic flow thru the site on facility questionnaires.

Parking lot observations revealed 13 of the 17 facilities had cars parked in the fire lane or no-parking area. Parking observers noted that patrons typically parked in areas that were not striped but were convenient.

STATISTICAL ANALYSIS

The Data Plot and Equation chart shows the relationship between the observed peak occupied parking spaces and the gross square footage of each facility. Occupied parking spaces as used in this analysis do not include spaces for vehicles pulled up at the gas pumps.

The chart shows that the facility's size is a weak predictor of the peak parking demand. The goodness of fit measure (R^2) is 0.12. This is close to 0, while a perfect predictor would have an R^2 value of 1.0. The chart also shows the high rate of parking demand for all facilities in the sample and the most common standard of one space per 200 square feet (for general retail) now used by Monroe County municipalities.

Note that the chart highlights several observations. The observation marked by the number 1 is the sole truck stop in the sample. The high numbers of vehicles parked at this facility reflect the fact that many truckers will layover here for a nap, a meal, or for other services that would not be the case at regular gas stations.

The observations marked by filled boxes indicate the peak parking demand at the six facilities with garage bays. These facilities tended to have a greater than average occupied parking spaces due to vehicles waiting for service or to be picked up.

A multiple regression analysis using square footage and a *second variable* for the presence or absence of garage bays does confirm the statistical significance of both variables in determining peak parking demand. The effect of the garage bay variable is even stronger when eliminating the truck stop observation from the analysis. In this case, the presence of a garage bay is a better predictor of peak parking demand than is the square footage (as measured by each variable's t-statistic. The goodness of fit (R^2) for the full equation rises to 0.37.

VARIABLES EXAMINED

Variables examined included whether the convenience store was part of a national chain, plaza or a freestanding structure. These variables were determined to not be significant. Some of the convenience stores did offer fast food services which was also not a significant determinant of peak parking demand. Whether the fast food offering was for dining-in or for take-out was not accounted for in the analysis.

CONCLUSIONS

Convenience stores with gas stations should provide spaces for vehicles to pull up at the fueling pumps and additional spaces for motorists patronizing the convenience store or leaving their car for servicing.

Customers of the convenience store patronize this area for a short duration which limits the build up of parked vehicles. While this analysis does show a slight positive relationship between the facility size and the number of parked cars, a separate analysis for convenience stores without automotive facilities shows that the square footage of convenience stores alone is not a determinant of peak parking demand.

Common Standard:	1 space per 200 sq. ft.
Survey Result:	Sufficient spaces for vehicles filling up at each fuel pump; 12 spaces away from the pumps for gas stations with walk-in convenience stores; 2 added spaces per garage bay; and, added spaces for fast food operations with seating areas for patrons eating-in

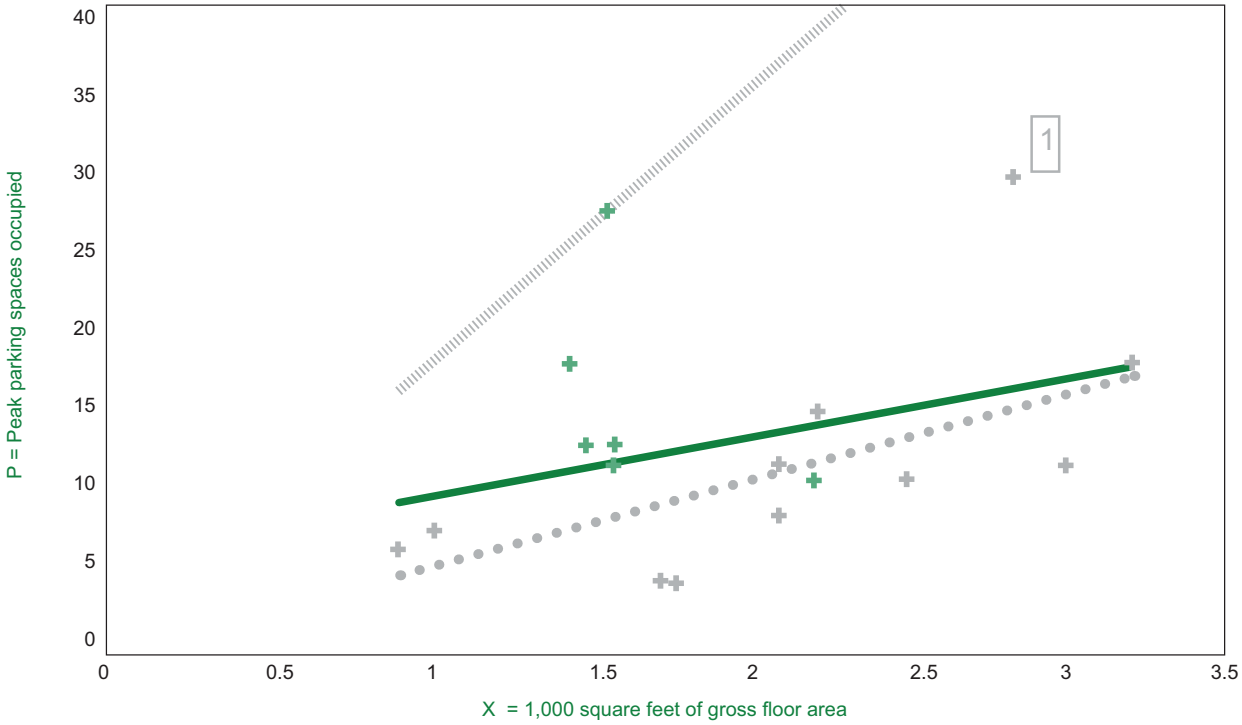
CONVENIENCE STORES WITH GAS STATIONS

PEAK PARKING SPACES OCCUPIED VS: SQUARE FOOTAGE

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. SQUARE FEET GFA
6.25 spaces per 1,000 sq. ft. of gross floor area	2.25 - 16.67	7.78	3.62	17	1,958
1 space per 160.0 sq. ft. of gross floor area	60.0 - 444.5	113.9	109.0		

DATA PLOT AND EQUATION



LEGEND			
No Garage Garage with Bays	Best Fitted Relationship	High Rate	Common Standard (1 Space per 200 Sq. Ft.)

FITTED LINEAR EQUATION: P=3.488(X) + 5.404 R^2 = 0.12

V-5. DAY CARES

LAND USE DESCRIPTION

Day Care facilities provide for the care of minor children on a somewhat regular basis. The period of care is generally less than 12 hours per day. The minor children are cared for in a facility other than the child's home. These facilities may be operated by a person, society, agency, corporation, institution, or any other group that is licensed by the state. Day Care facilities may be operated in conjunction with a business, school, religious facility or as an independent commercial enterprise with or without academic instruction. The facilities included in this analysis provided a variety of full time and part time care options.

FACILITY INFORMATION

The 19 facilities used in the analysis accommodated between 25 and 206 children at the time of the count. Facilities ranged in size from 2,408 square feet to 23,255 square feet. This land use is generally located in freestanding buildings. Three sites surveyed were located in a church and three others were located in a school.

Eighteen of the sites surveyed had public transit available within a quarter mile, which employees or clients could use.

PARKING SURVEY INFORMATION

Of the 19 facilities examined, two were in an urban location, 15 were in a suburban location and one was in a rural location.

The day care facilities were surveyed between the years of 2001 and 2003 in Monroe County, New York. In all cases the morning peak parking demand occurred from 7:00 a.m. to 9:15 a.m. while the evening peak parking demand occurred from 3:15 p.m. to 5:30 p.m. Weekend parking lot counts were deemed inappropriate based on questionnaires completed by facility owners and/or managers.

FACILITY OBSERVATION

One comment that was made by two facility managers was that their parking lot did not have enough spaces for their needs. Three other managers stated that their parking lots offered more than enough parking spaces for their needs. Another facility offers a specialized preschool program that has buses dropping off and picking up children four times a day. Finally one other manager stated that most employees use public transportation to get to work.

Parking observers noted that four sites either did not have striping or that it was very light. These facilities had especially confusing traffic patterns. Another site was noted for its high volumes of drop-offs and pick-ups at once, which would be less congested if the entrance and exit were more clearly marked.

STATISTICAL ANALYSIS

The Data Plot and Equation charts show the peak observed occupied parking spaces in relation to the square footage and number of enrolled children at the respective day care facilities. Both charts include a line to show the statistical best fit linear relationship, and a high observed rate for parked vehicles. A few Monroe County municipalities have a parking standard for day care centers based on the number of children enrolled. The most common of these, one parking space per six enrolled, appears on that chart. None of the municipalities has a standard based on day care center square footage.

Of the variables tested, the number of enrolled children has the strongest relationship to the number of vehicles parked at the sites. This is evident on the chart from the concentration of points close to the best fit line, and the high goodness of fit measure, R^2. The R^2 value is 0.83, close to the perfect fit score of 1.0. The best fit line indicates that for each added enrolled child, the number of parking spaces occupied goes up by 0.22. Day care facility parking demand also has a positive relationship to the size of the facility, but the relationship is not as strong. The R^2 value for this equation is only 0.48.

VARIABLES EXAMINED

Variables examined considered various functional forms of the square footage and enrolled children variables. Some of these offered slight improvements in the goodness of fit compared with the linear form of these variables. The improvements, however, were minor and did not outweigh the benefit of the linear relationship's simplicity. The number of cars that stopped briefly for day care center pick-ups and drop-offs would likely have influenced the number of cars that would need to park. Not all day care centers are set up to allow easy in-car pick-ups and drop-offs. The supporting policies and the number of no-parked vehicles used for pick-ups and drop-offs were not consistently determined, and thus could not be used in the analysis.

CONCLUSIONS

The most common standard found for day care facilities of one parking space per six enrolled children is below the rate at seven of the 18 facilities observed. A rate of one space per four and a half enrolled children would be sufficient for the parking volumes observed. The data also suggests that this rate is not excessive, and would ensure sufficient capacity for drivers to stop briefly without parking for child drop-offs and pick-ups.

Common Standard:	1 space per 6 enrolled children
Survey Result:	1 space per 4.5 enrolled children

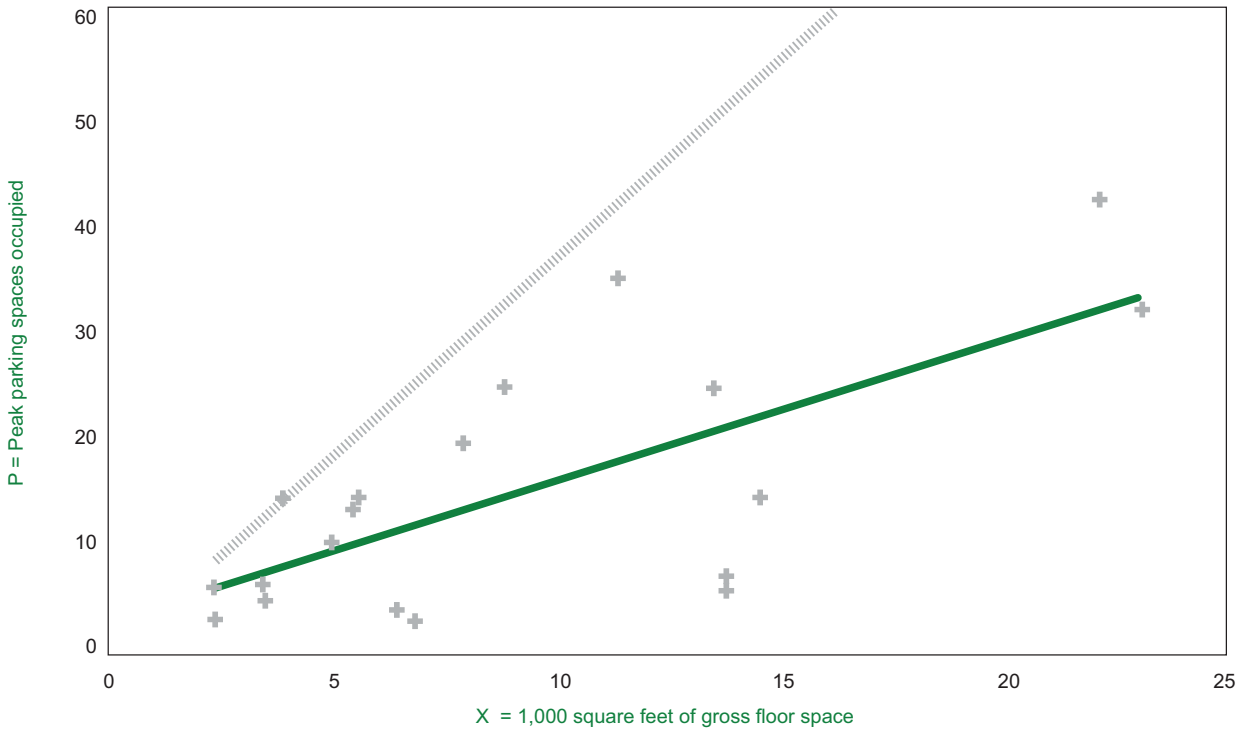
DAY CARES

PEAK PARKING SPACES OCCUPIED VS: SQUARE FOOTAGE

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. SQUARE FEET GFA
1.58 spaces per 1,000 sq. ft. of gross floor area	.43 - 3.56	1.95	0.92	19	9,220
1 space per 630 sq. ft. of gross floor area	2,310 - 280	510	707		

DATA PLOT AND EQUATION



LEGEND		
Actual Data Points	Best Fitted Relationship	High Rate

FITTED LINEAR EQUATION: P=1.261(X) + 2.947 R^2 = 0.48

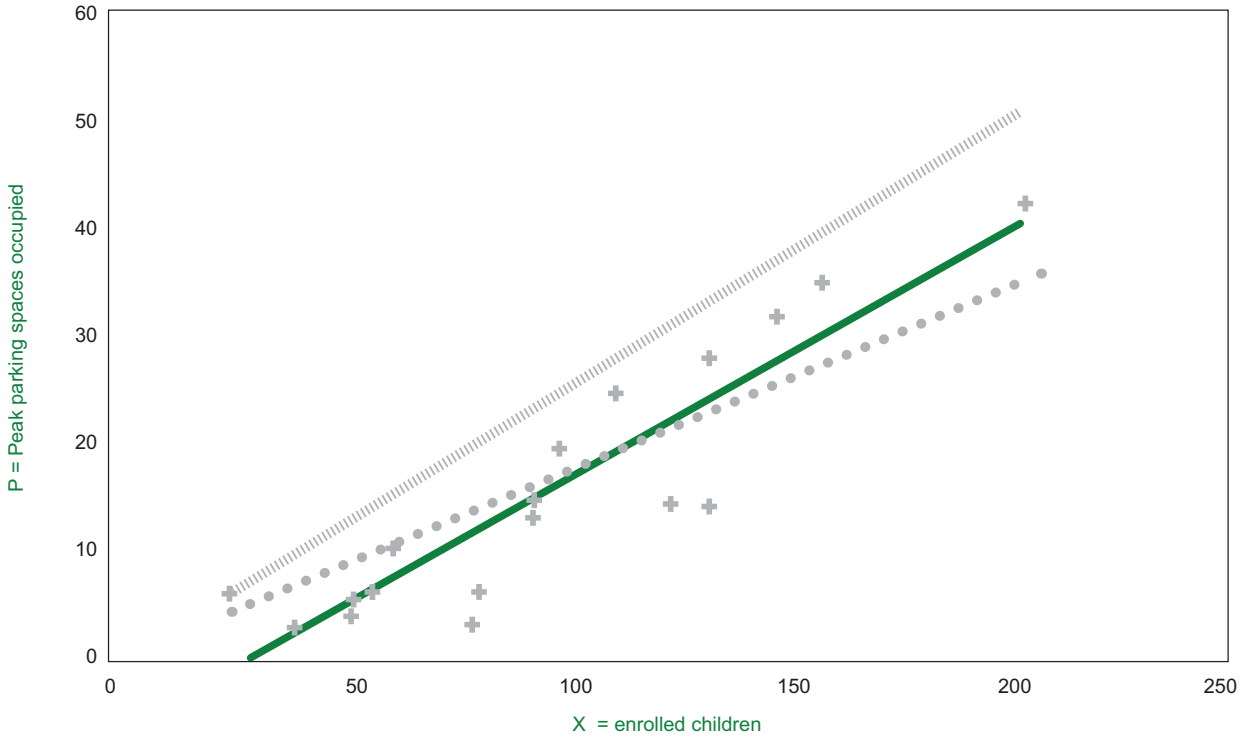
DAY CARES

PEAK PARKING SPACES OCCUPIED VS: NUMBER OF CHILDREN ENROLLED

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. NUMBER OF ENROLLED CHILDREN
.16 parking spaces per enrolled child	.04 - .24	.18	.06	18	98.1
1 parking space per 6.45 enrolled children	26.67 - 4.17	5.55	5.50		

DATA PLOT AND EQUATION



LEGEND			
Actual Data Points	Best Fitted Relationship	High Rate	Common Standard (1 Space per 6 Enrolled)

FITTED LINEAR EQUATION: P=0.224(X) + -6.777 R^2 = 0.83

V-6. DONUT, COFFEE AND BAGEL SHOPS WITH DRIVE THRU

LAND USE DESCRIPTION

Donut, coffee and bagel shops with a drive thru are informal restaurants offering primarily donuts, coffee and bagels where customers order by means of a walk-up counter, or window designed to accommodate automobile traffic. Generally eating areas are provided and consumption may be either on or off the premises.

FACILITY INFORMATION

The 5 facilities surveyed ranged in size from 2,622 square feet to 4,428 square feet. All 5 facilities in this land use were located in freestanding buildings, one of which was an out parcel to a shopping plaza.

All five sites included in the study had public transit available within a quarter mile, which employees and customers could use.

PARKING SURVEY INFORMATION

Of the five facilities examined, two were in an urban location, three were in a suburban location and no sites were located in a rural location.

The donut, coffee and bagel shops with a drive thru were surveyed in 2004 in Monroe County, New York. All the facilities surveyed were part of a national chain. In all but one case, the peak parking demand occurred between the hours of 6:45 a.m. and 8:45 a.m. on Friday mornings. It should be noted that there was no noticeable difference between the maximum volume of parked cars observed for weekend days and the rate observed on weekdays.

FACILITY OBSERVATION

One comment by a facility owner/manager was that plenty of stacking room is needed for a drive thru. This facility recommends a minimum 10 car stacking for their drive thru. Another facility owner or manager commented that their site did not have enough parking directly in front of the entrance doors.

Parking observers noted that three of the five sites had cars parked in the fire lane or no parking area some time throughout the observation. One observer noted that one facility only had pavement markings for handicap spots. When it snowed during the observation, the handicap spaces looked the same as standard spaces.

STATISTICAL ANALYSIS

The Data Plot and Equation Chart shows the relationship between peak observed occupied parking spaces relative to the square footage of the respective donut, coffee and bagel shops with a drive thru. The presence of a drive thru window does statistically affect the rate of peak parking demand. Thus, donut, coffee and bagel shops are presented as two land uses, donut, coffee and bagel shops with a drive thru and donut, coffee and bagel shops without a drive thru.

The graph also shows the best fit relationship for peak occupied spaces as a function of square footage of the facilities. The small sample size and distribution of the data may impact the usefulness of the goodness of fit measurement.

VARIABLES EXAMINED

In addition to testing square footage as a determinant of peak parking spaces, variables examined the time of week (weekday or weekend) and whether the facility sold just bagels/donuts or just coffee. The analysis did not indicate that either of these was statistically different, although a larger sample may have yielded different results.

CONCLUSIONS

There are currently no parking codes among Monroe County municipalities exclusively for donut, coffee and bagel facilities. Fast food restaurants are somewhat comparable, and the graph presents a fairly common standard for this use: 1 space per 100 square feet of gross floor area. This rate appears reasonable for the donut, coffee and bagel shops with a drive thru.

The available data suggests that donut, coffee and bagel shops with a drive-thru generates over 40 percent fewer occupied parking spaces than does a similarly sized facility without a drive-thru. The sample does fit within the 1 space per 100 square feet common standard (for fast food facilities), but a fixed rate of 25 parking spaces, seems to be more appropriate for shops in the 1,500 to 4,500 square foot range that also have drive thru facilities.

Common Standard:	No common standard; fast food most similar with 1 space per 100 sq. ft.
Survey Result:	Fixed number of 25 spaces for shops with 1,500 sq. ft. – 4,500 sq. ft.

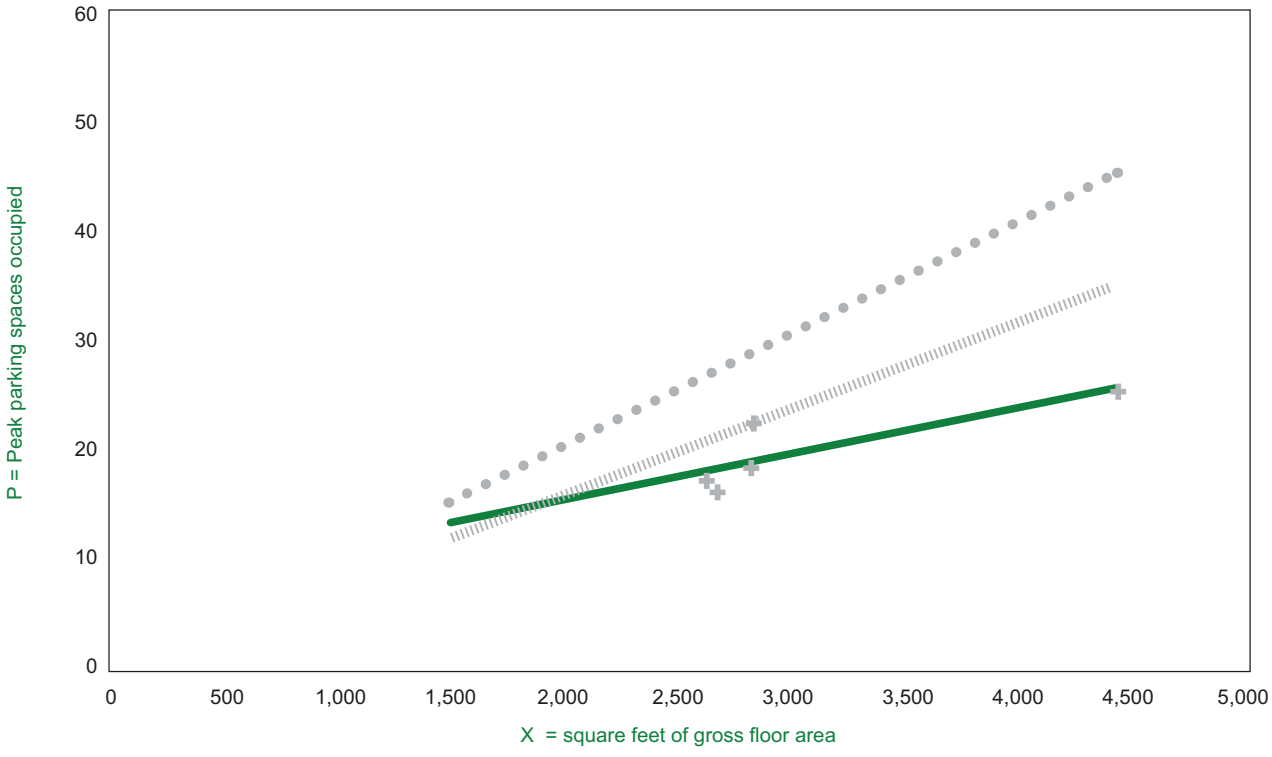
DONUT, COFFEE AND BAGEL SHOPS WITH A DRIVE THRU

PEAK PARKING SPACES OCCUPIED VS: SQUARE FEET OF GROSS FLOOR AREA

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. SQUARE FEET GFA
0.006 spaces per 1 sq. ft. of gross floor area	0.006 - 0.008	0.007	0.001	5	3,073
1 space per 156.8 sq. ft. of gross floor area	128.2 - 177.1	139.3	18.3		

DATA PLOT AND EQUATION



LEGEND			
Actual Data Points	Best Fitted Relationship	High Rate	Common Standard (1 Space per 100 Sq. Ft.)

FITTED LINEAR EQUATION: P=0.00417(X) + 6.758 R^2 = 0.71

V-7. DONUT, COFFEE AND BAGEL SHOP WITHOUT A DRIVE THRU

DESCRIPTION

Donut, coffee and bagel shops without a drive thru are informal restaurants offering primarily donuts, coffee and bagels where customers order and/or service may be by means of a walk-up counter. Accommodations are not provided for drive thru automobile traffic. Generally eating areas are provided and consumption may be either on or off the premises.

FACILITY INFORMATION

The nine facilities surveyed ranged in size from 1,750 square feet to 3,167 square feet. Four of the nine sites were located in a shopping center. These sites were chosen because observers were able to distinguish parking spaces devoted to this land use based on curb cuts, landscaping features and observation.

Eight of the sites surveyed had public transit available within a quarter mile, which employees and customers could use.

PARKING SURVEY INFORMATION

Of the nine facilities examined, one was in an urban location, eight were in a suburban location and there were no sites located in a rural location.

The donut, coffee and bagel shops without a drive thru were surveyed between the years of 2003 and 2004 in Monroe County, New York. All but one facility were part of a national chain. In all cases, the peak parking demand occurred between the hours of 8:00 a.m. and 10:00 a.m. on Friday and Saturday mornings. Note that there was no noticeable difference between the maximum volume of parked cars observed for weekend days and the rate observed on weekdays.

FACILITY OBSERVATION

Comments from facility questionnaires for donut, coffee and bagel shops without a drive thru revealed that two of the nine facilities described a shortage of parking as a problem. Five of the nine sites revealed that due to their location within a shopping center, they have plenty of room for overflow parking.

Parking observers noted that seven of the nine sites had cars parked in the fire lane or in a no parking area sometime throughout the observation. It also appeared that parking close to the entrance of the facility was important to the patrons of these facilities.

STATISTICAL ANALYSIS

The Data Plot and Equation chart shows the relationship between peak observed occupied parking spaces relative to the square footage of the respective donut, coffee and bagel shops without a drive thru. The presence of a drive thru window does statistically affect the rate of peak parking demand. Thus, donut, coffee and bagel shops are presented as two land uses, donut coffee and bagel shops without a drive thru and donut, coffee and bagel shops with a drive thru.

The charts also show the best fit relationship for peak occupied spaces as a function of square footage of the facilities. The line for facilities without a drive thru is relatively flat and several of the observed points deviate far from this best fit line. This suggests that size of the facility is not a strong determinant of peak occupied parking spaces. This weak relationship between the square footage of the no drive thru facilities and the number of parked vehicles is also evident in the goodness of fit measurement ($R^2 = 0.02$) which is close to zero.

VARIABLES EXAMINED

In addition to testing square footage as a determinant of peak parking spaces, weekday verses weekend was examined and whether the facility sold only bagels/donuts or coffee. The analysis did not indicate that either of these variables was statistically different, although a larger sample may have yielded different results.

CONCLUSIONS

For donut, coffee and bagel shops without drive thrus, the observations suggest that square footage is a positive, but weak indicator of peak demand for parking spaces. The observed parking demand does tend to grow at a slight rate as the size of the shop increases, but the rate is so slight that a fixed parking standard of 35 parking spaces for shops between 1,500 and 4,000 square feet is more reasonable than a standard based on a fixed ratio to the square footage. In any case, the common standard (for fast food restaurants) of 1 space per 100 square feet is too low for donut, coffee and bagel shops without a drive thru**.** The addition of a drive thru window reduces the demand for parking spaces significantly. Refer to Donut, Coffee and Bagel shops with a drive thru for more information.

There are currently no parking codes among Monroe County municipalities exclusively for donut, coffee and bagel facilities. Fast food restaurants are somewhat comparable, and the charts present a fairly common standard for this use: 1 space per 100 square feet of gross floor area. Donut, coffee and bagel shops without a drive thru have peak parking demands above this rate. The high rate observed for facilities without a drive thru is one space for every 58.8 gross square feet.

Common Standard:	No common standard; fast food most similar with 1 space per 100 sq. ft.
Survey Result:	Fixed number of 35 spaces for shops with 1,500 sq. ft. – 4,000 sq. ft.

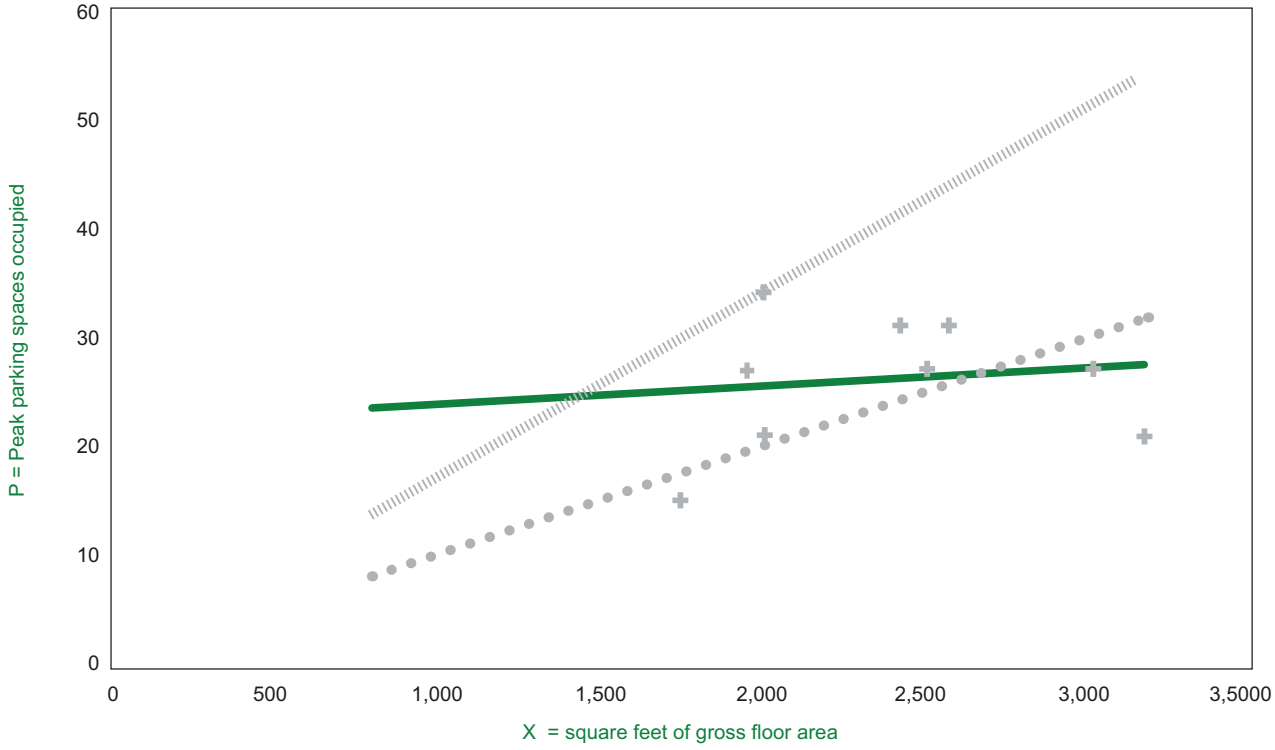
DONUT, COFFEE AND BAGEL SHOPS WITHOUT A DRIVE THRU

PEAK PARKING SPACES OCCUPIED VS: SQUARE FEET OF GROSS FLOOR AREA

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. SQUARE FEET GFA
0.011 spaces per 1 sq. ft. of gross floor area	0.007 - 0.017	0.013	0.003	9	2,373
1 space per 91.28 sq. ft. of gross floor area	58.82 - 150.81	74.13	27.66		

DATA PLOT AND EQUATION



LEGEND			
Actual Data Points	Best Fitted Relationship	High Rate	Common Standard (1 Space per 100 Sq. Ft.)

FITTED LINEAR EQUATION: P=0.0017(X) + 21.953 R^2 = 0.02

V-8. FAMILY RESTAURANTS, MENU

LAND USE DESCRIPTION

Menu family restaurant facilities are establishments where food and beverages are served to the public on demand from a menu. These establishments have stated business hours and serve food in and on reusable containers and dinnerware. Food is generally consumed on the premises. Most of the facilities surveyed served alcohol.

FACILITY INFORMATION

The 14 facilities surveyed ranged in size from 2,115 square feet to 9,180 square feet. All but 4 of the facilities included in this analysis were free-standing structures. Four of the freestanding facilities surveyed were out parcels to a plaza. Eight of the restaurants were part of a national chain.

Thirteen facilities had public transit available within a quarter mile, which employees and customers could use.

PARKING SURVEY INFORMATION

All 14 of the facilities examined were located in suburban locations.

The menu family restaurants were surveyed between the years of 2003 and 2004 in Monroe County, New York. In twelve cases the peak parking lot demand occurred between 5:30 p.m. and 8:30 p.m on a Friday evening. Observations were made based on the hours reported on the facility questionnaires as the busiest time of the week by facility managers.

FACILITY OBSERVATION

Comments from facility questionnaires reveal that five facility owners and/or managers would like additional parking spaces. Two of those facilities are located in shopping centers and have problems with patrons not finding parking nearby.

Parking observations revealed that five of the fourteen sites had cars parked in the fire lane or no parking area at some point during the observation. One parking lot did not have medians or curbs and people parked at the end of aisles during peak hours. Two other sites were observed having cars drive very fast thru the parking lot while one other site was noted for not having enough handicap parking spots.

STATISTICAL ANALYSIS

The Data Plot and Equation charts show the relationship between the peak observed occupied parking spaces and the square footage or seats of the respective menu restaurant. The statistical analysis of parking spaces to the number of restaurant seats included observations from 11 of the 14 observed facilities.

The charts show the best fit line to match the data, an extrapolated high rate for the sample, and respective parking standards (square footage and seats) currently used by several Monroe County municipalities. A standard of one space per two seats, which is consistent with the standard used in Monroe County, seems reasonable based on the analysis.

The data indicates that peak parking demand rises at a fairly linear rate with the increasing size of the menu family restaurants. This is particularly true when size is measured by the restaurant's number of seats, as is indicated by the high statistical significance of the best fit line (an R^2 of 0.73).

Square footage is a positive indicator of peak parking demand, but it is statistically weaker determinant (R^2 = 0.46) than the restaurant's number of seats (an R^2 of 0.73). In addition a few of the observations deviate widely from the number of occupied parking spaces predicted. The common standard of 1 space per 100 square feet of gross floor area is below the average (1 space per 81.5 square feet) or the best fit line for the sample.

VARIABLES EXAMINED

The analysis tested various functional forms of restaurant square footage and number of seats. Whether the restaurant was part of a national chain was not significant.

CONCLUSIONS

Analysis of restaurant square footage and the number of seats indicated that both size and seats are a statistically significant determinant of a menu restaurant's peak parking demand.

Policymakers should consider both dimensions of size, square footage and number of seats, in setting parking standards for this land use. The number of seats is a better predictor of peak parking demand than is the restaurant's square footage. The data suggests that a rate of 1 space per 50 square feet or one space per two seats would be reasonable to use as a standard for this land use. This standard based on square footage is above the average for the 14 menu restaurants in the sample, but five of the restaurants had observed rates of 1 space per 60 square feet or less.

Common Standard:	1 space per 100 sq. ft. or 1 space per 2 seats
Survey Result:	1 space per 2 seats or 1 space per 50 sq. ft.

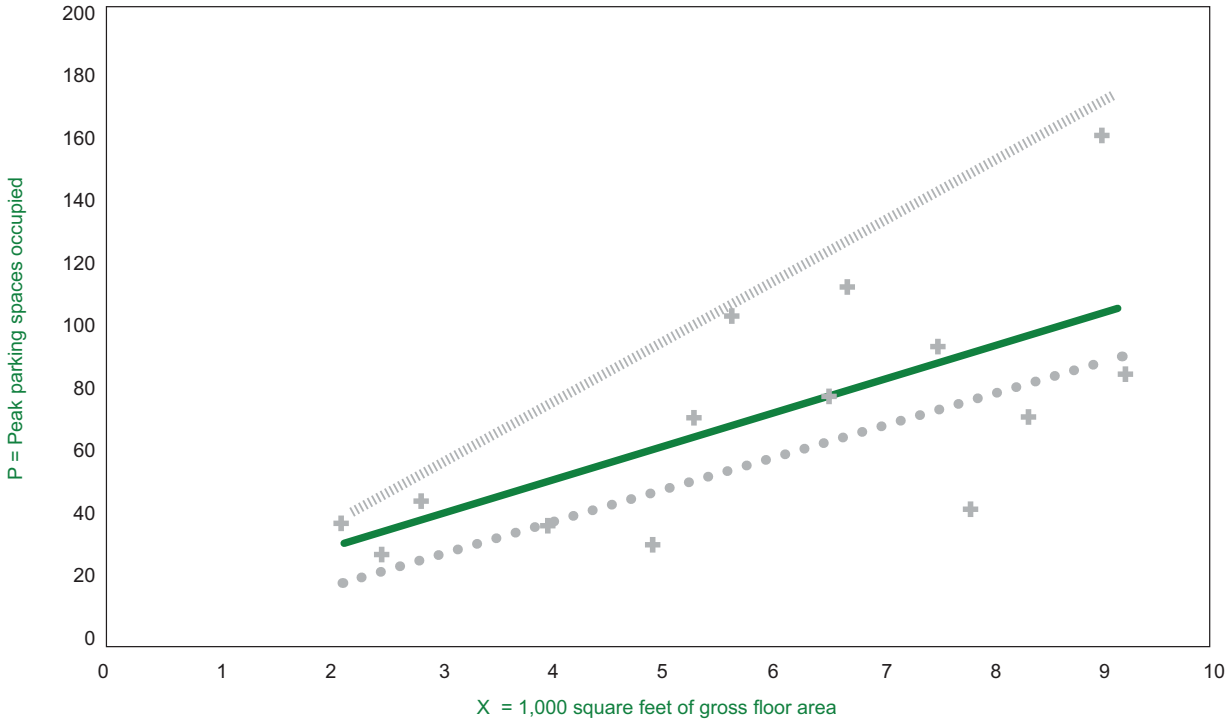
FAMILY RESTAURANTS, MENU

PEAK PARKING SPACES OCCUPIED VS: SQUARE FOOTAGE

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. SQUARE FEET GFA
12.27 spaces per 1,000 sq. ft. of gross floor area	5.64 - 18.91	14.34	4.37	14	5,881
1 space per 81.5 sq. ft. of gross floor area	52.9 - 177.3	63.8	37.4		

DATA PLOT AND EQUATION



LEGEND			
Actual Data Points	Best Fitted Relationship	High Rate	Common Standard (1 Space per 100 Sq. Ft.)

FITTED LINEAR EQUATION: P=10.333(X) + 11.379 R^2 = 0.46

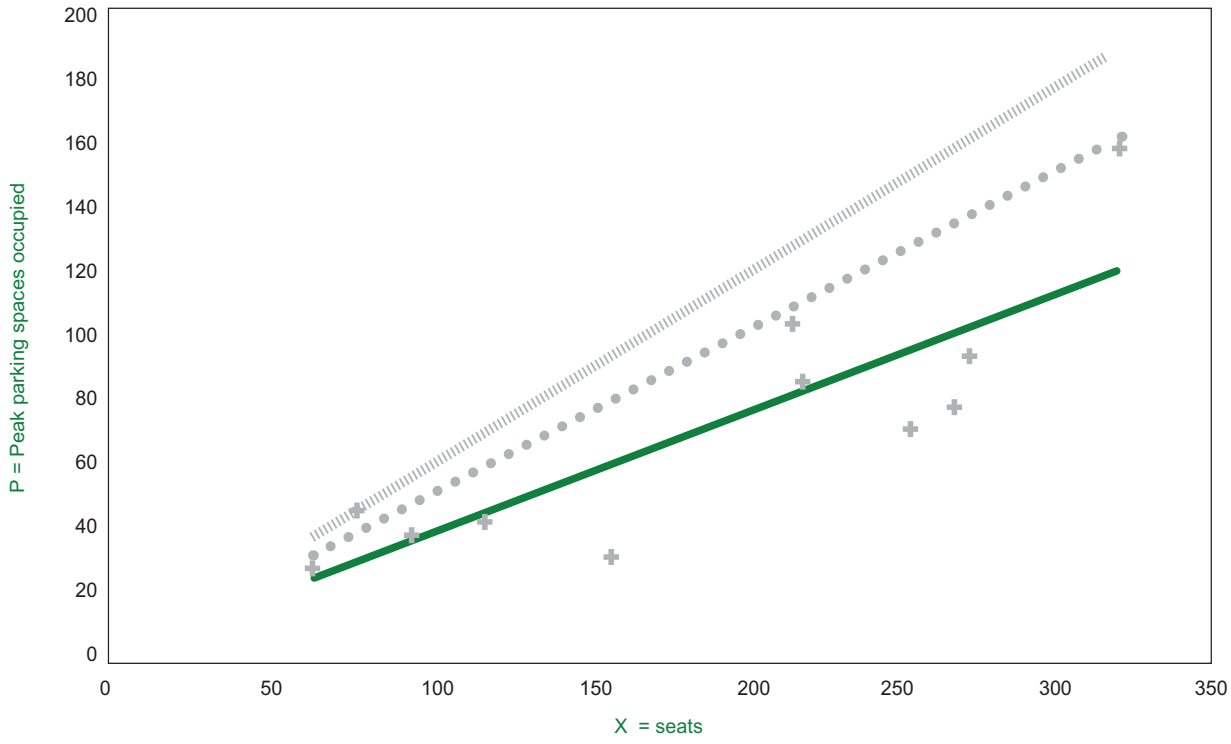
FAMILY RESTAURANTS, MENU

PEAK PARKING SPACES OCCUPIED VS: SEATS

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVGERAGE SEATS
.38 spaces per seat	.21-.59	.44	.11	11	188.7
1 space per 2.64 seats	1.70 - 4.85	2.15	.89		

DATA PLOT AND EQUATION



LEGEND			
Actual Data Points	Best Fitted Relationship	High Rate	Common Standard (1 Space per 2 Seats)

FITTED LINEAR EQUATION: P=0.371(X) + 1.348 R^2 = 0.73

V-9. FAMILY RESTAURANTS, MENU BOARD

LAND USE DESCRIPTION

Menu Board Family Restaurants serve food and beverages excluding alcohol on demand from a menu board near the order counter to be consumed while seated at booths or tables or can be consumed off premises.

FACILITY INFORMATION

The 10 facilities surveyed ranged in size from 1,500 square feet to 7,023 square feet. This land use is generally located in freestanding buildings. Nine of the facilities included in the analysis were freestanding One facility surveyed was located in a shopping center. All of the facilities provided for take out service and almost half also offered an ice cream counter.

All facilities had public transit available within a quarter mile, which employees and customers could use.

PARKING SURVEY INFORMATION

Of the 10 facilities examined, one site was located in an urban area, nine sites were located in a suburban area and no sites were located in a rural area.

The menu board family restaurants were surveyed in the year of 2004 in Monroe County, New York. In most cases the peak parking lot demand occurred on a Friday between 12:00 p.m. and 1:15 p.m.

FACILITY OBSERVATION

Comments from facility questionnaires revealed that four of ten facility managers and/or owners believe they have a shortage of parking spaces available. One manager stated that he was concerned over the perception that there are not enough parking spaces available. Two sites reported they had plenty of parking available.

Parking lot observations revealed that six of ten sites had vehicles parked in the fire lane or no parking area at some point during the observation. Observers also noted that the sites with the excellent traffic flow had an entrance/exit off a main thoroughfare as well as an entrance/exit onto a side street. One site was reported as having a shortage of parking based on observation.

STATISTICAL ANALYSIS

The Data Plot and Equation Charts show the relationship between the peak observed occupied parking spaces and the square footage or seats of the menu board family restaurant. The statistical analysis of parking spaces with respect to restaurant square footage included observations from 10 facilities. The analysis of parking spaces with respect to seats used only six observations, as the questionnaire from four facilities lacked key information necessary to be included in the analysis.

Both charts show a best fit line for the data. For the square footage chart, the curved line suggests that peak parking demand grows continuously with increasing size of the restaurant, but the rate of increased demand flattens as the restaurant exceeds 3,000 to 4,000 square feet. Note that this flattening slope of the line largely reflects the influence of the two largest facilities observed, both of which had far lower than average rates of parking demand per square foot.

The average rate for the ten facilities analyzed was 1 parking space per 105.6 square feet. This is close to the 1 space per 100 square foot parking standard used by several Monroe County municipalities. A line for this common standard is also shown on the chart.

The best fit line for the seats chart is linear, but it is based on fewer observations, and it has a poorer goodness of fit than that for the square footage chart (as measured by the R^2 value further from 1.0). The line also deviates furthest from the high rate of parking demand and from the common standard based on the respective variable (square footage or seats). The best fit line is 17.7 parking spaces plus 1 parking space for approximately every 10 seats. A menu board family restaurant of 200 seats would thus be expected to have a parking demand of about 37 spaces. This translates into a rate of 1 parking space per 5.4 seats, a rate far higher than the current common standard of 1 parking space per 2 seats.

VARIABLES EXAMINED

The analysis tested various functional forms of restaurant square footage and number of seats. Whether the restaurant was part of a national chain was not significant, and the data did not support further analysis into suburban or urban location.

CONCLUSIONS

Analysis of restaurant square footage or the number of seats verses peak parking demand indicates that size and number of seats are both statistically significant determinants of a menu board family restaurant's peak parking demand.

Policymakers should consider both dimensions of size in setting parking standards for this land use. The analysis of square footage in this study relies on more observations and yields a higher goodness of fit (R^2) than does the best fit line based on seats.

The exact rate of parking spaces per square foot to use as a standard is somewhat unclear. The rates for the facilities examined ranged widely from one space per 61 square feet to one space per 201 square feet. A standard of 1 space per 80 square feet up to a maximum of 80 spaces appears to be sufficient to meet peak demand for menu board family restaurants up to about 8,000 square feet.

Common Standard:	1 space per 100 sq. ft. or 1 space per 2 seats
Survey Result:	1 space per 2 seats, up to a maximum of 80 spaces or <8,000 sq. ft. = 1 space per 80 sq. ft.

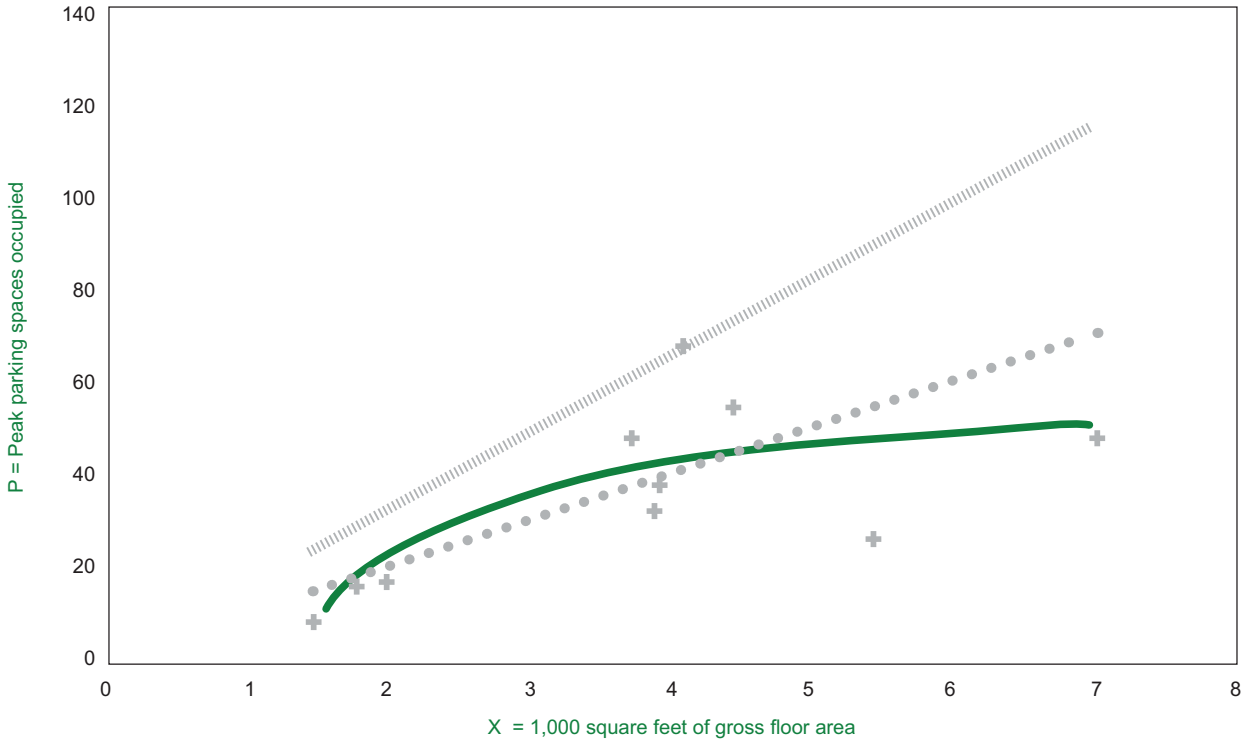
FAMILY RESTAURANTS, MENU BOARD

PEAK PARKING SPACES OCCUPIED VS: SQUARE FOOTAGE

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. SQUARE FEET GFA
9.47 spaces per 1,000 sq. ft. of gross floor area	4.96 - 16.31	11.46	3.43	10	3,790
1 space per 105.6 sq. ft. of gross floor area	61.3 - 201.5	80.6	43.0		

DATA PLOT AND EQUATION



LEGEND			
Actual Data Points	Best Fitted Relationship	High Rate	Common Standard (1 Space per 100 Sq. Ft.)

FITTED CURVE EQUATION: P = -1/79.986(X) + 62.238 R^2 = 0.59

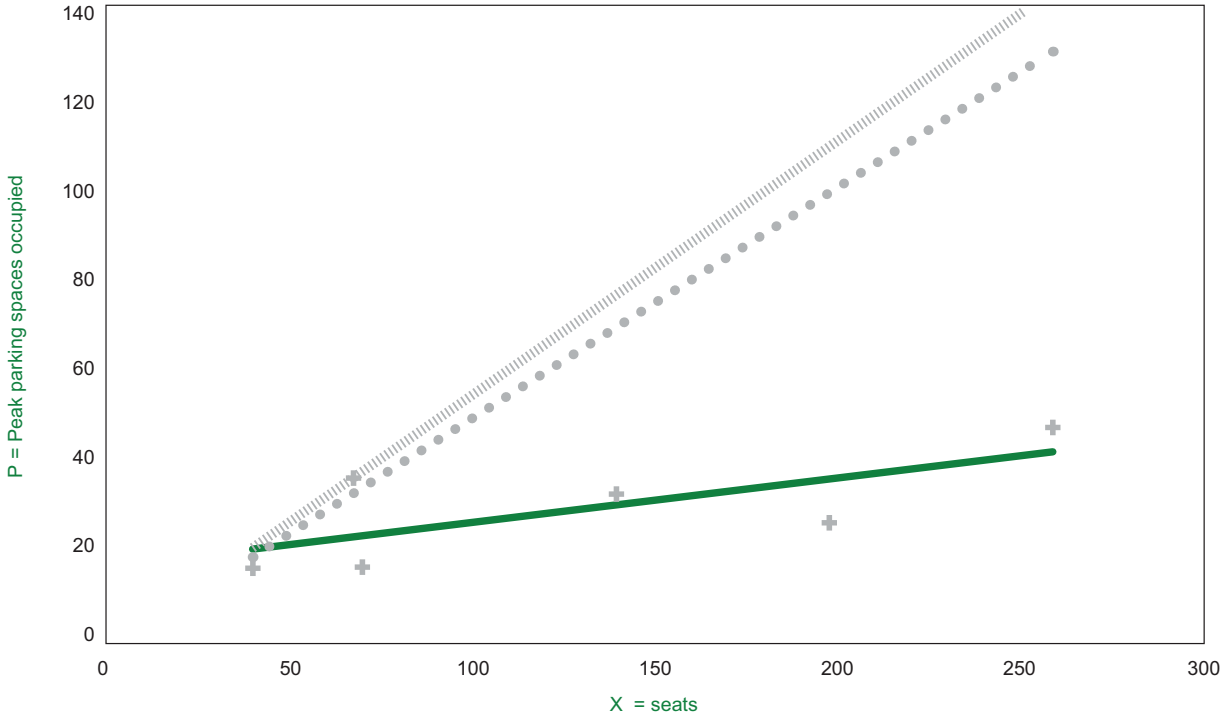
FAMILY RESTAURANTS, MENU BOARD

PEAK PARKING SPACES OCCUPIED VS: NUMBER OF SEATS

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVERAGE SEATS
.23 spaces per seat	.14 - .55	.36	.16	6	130
1 space per 4.29 seats	1.82 - 7.33	2.63	2.02		

DATA PLOT AND EQUATION



LEGEND			
Actual Data Points	Best Fitted Relationship	High Rate	Common Standard (1 Space per 2 Seats)

FITTED LINEAR EQUATION: P=0.096(X) + 17.691 R^2 = 0.48

V-10. FAST FOOD RESTAURANTS WITH A DRIVE THRU

LAND USE DESCRIPTION

Fast Food Restaurants with a Drive Thru are all part of a national chain where customers order by means of a window designed for automobile traffic or by means of a walk up counter. For patrons opting to order by means of the walk up counter, there is an eating area for those who choose to eat at the facility.

FACILITY INFORMATION

The 15 facilities surveyed ranged in size from 1,824 to 5,074 square feet. The facilities counted were all freestanding buildings. Four were out parcels to a shopping center. Each facility had its own parking area separate from other businesses. Two of the facilities had playground equipment available for patrons use.

Fourteen of the sites surveyed had public transit available within a quarter mile, which employees and customers could use.

PARKING SURVEY INFORMATION

Of the 15 facilities examined, three were in urban locations, 12 were in suburban locations and none were in a rural location.

The fast food facilities were surveyed in 2003 in Monroe County, New York. In most cases the peak parking demand occurred during the lunch hours of 12:15 p.m. to 1:15 p.m. and early evening hours of 4:30 p.m. to 6:00 p.m.

FACILITY OBSERVATION

One comment made by a facility owner/manager was that many people drive too fast thru the site. Two other managers noted difficulty in entering and exiting the site due to heavy traffic. One other manager stated that due to the three entrances onto this manager's site, confrontations have occurred between drive thru customers during peak hours because it is difficult to tell where the drive thru line starts.

Parking lot observers noted that at 5 of 15 sites the handicap spaces were quite far from the entrance to the building. It was also common for pedestrians to cross traffic flow or the drive thru line to get from their parked cars to the entrance of the facility. This presented a great danger, especially for facilities with play areas for children. Two sites provided crosswalks with signage and pavement markings to warn drivers of pedestrians.

Three observers noted that stacking room was very important for this land use because of the landscaping and construction crews using the drive thru with their large trailers. The space that the large trucks with trailers take up increases the size needed to accommodate stacked vehicles. Large delivery trucks that could not fit in the drive thru often parked horizontally across several parking spaces so not to interfere with the drive thru flow.

STATISTICAL ANALYSIS

The Data Plot and Equation chart shows the peak occupied parking spaces relative to the square footage of the respective fast food restaurants with a drive thru. The chart shows the best fit curve to match the data, a high rate for the sample, and a common parking standard used by Monroe County municipalities.

The best fit curve is non-linear and indicates that increasingly large fast food restaurants tend to have less than a commensurate increase in parking demands. The formula, however, is statistically weak (an R^2 of 0.09), and the counts at several sites in the sample deviate widely from the number of occupied parking spaces predicted. A statistically strong formula would yield a R^2 close to 1.0. The common standard of 1 space per 100 square feet of gross floor area is slightly above the highest rate for the sample (1 space per 119 square feet).

VARIABLES EXAMINED

The inclusion of a variable to distinguish the national chain of fast food restaurant did not improve the model's fit. The analysis also included various data transformations and other functional forms. Some of these did yield slightly better statistical fits than did the simple linear models, but the improvement was too small to make it worth the added complexity in the equations. Note that several Monroe County municipalities use a parking standard for fast food restaurants based on the facility's occupancy or number of seats.

CONCLUSIONS

The statistical relationship between the size of the fast food restaurant and its peak parking demands is very weak. Above 2,500 square feet (the size of most fast food restaurants), there is wide variation in parking demand, but the best fit predicted demand for parking spaces is almost flat at about 18 spaces. This suggests that a standard in the form of "one space per X square feet" would be unnecessary for most large fast food restaurants. A more reasonable approach might be to combine the highest rate (1 space per 119 square feet) and the highest actual parking demand (31 spaces) found in the sample. Thus, the standard might be 1 space for every 120 square feet up to a maximum of 32 spaces. The standard could make exceptions for some theoretically very large fast food restaurants, perhaps over 6,000 square feet.

Policymakers might also want to ensure that fast food restaurants have adequate capacity and circulation plans for their drive thru customers. One code within Monroe County currently requires 5 stacking spaces per drive thru lane. Another code requires 10 stacking spaces for the drive thru. These are the only Monroe County municipalities that now account for the drive thru as part of the common code.

Common Standard:	1 space per 100 sq. ft.
Survey Result:	1 space for every 120 sq. ft., up to a maximum of 32 spaces

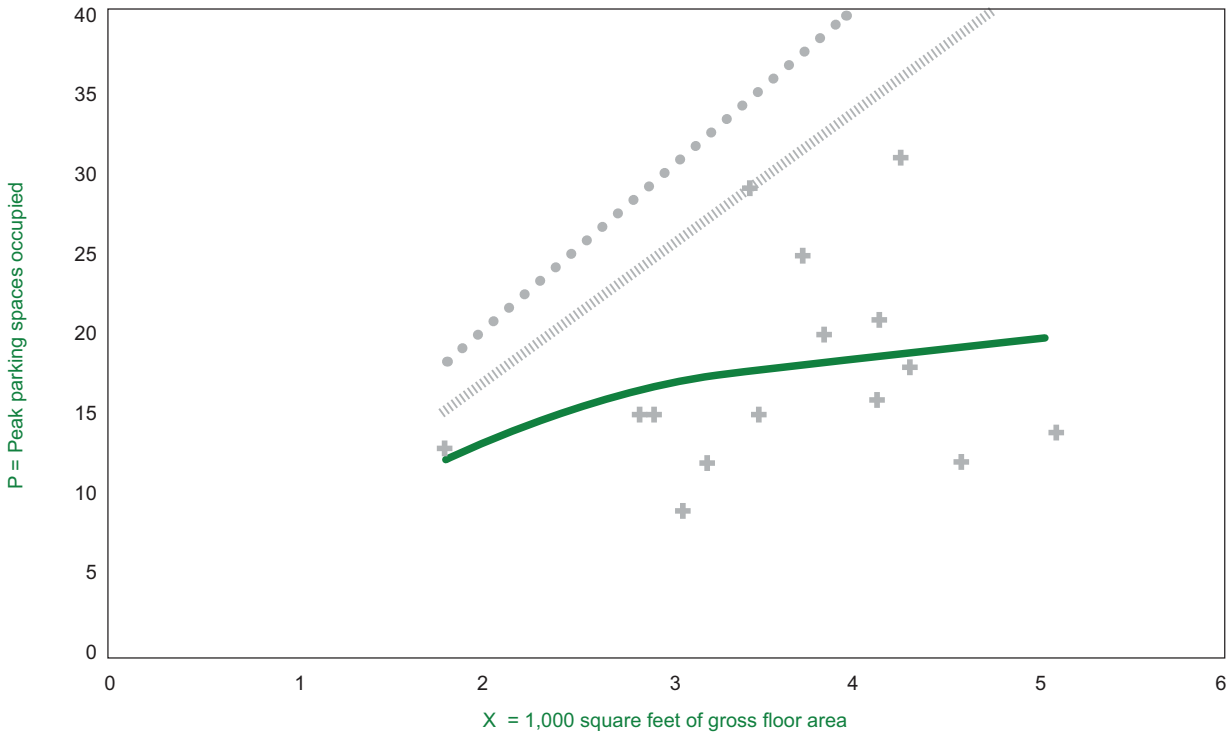
FAST FOOD RESTAURANTS WITH A DRIVE THRU

PEAK PARKING SPACES OCCUPIED VS: GROSS SQUARE FOOTAGE OF FACILITY

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. SQUARE FEET GFA
4.62 spaces per 1,000 sq. ft. of gross floor area	2.62 - 8.39	5.61	1.76	15	3,666
1 space per 207.5 sq. ft. of gross floor area	119.2 - 381.8	169.8	82.9		

DATA PLOT AND EQUATION



LEGEND			
Actual Data Points	Best Fitted Relationship	High Rate	Common Standard (1 Space per 100 Sq. Ft.)

FITTED CURVE EQUATION: P=-22.135(X) + 24.071 R^2 = 0.09

V-11. FITNESS CENTERS, ADULT

LAND USE DESCRIPTION

Adult fitness centers are privately owned membership facilities for adults and used for body conditioning and physical exercise.

FACILITY INFORMATION

The 12 facilities surveyed ranged in size from 7,500 square feet to 31,500 square feet. This land use is generally located in shopping centers. Two sites were located in freestanding buildings. Most of the facilities offered fitness classes and approximately half of those used in the survey offered day care and other services such as trainers, physical therapy or massage therapy.

Eleven sites surveyed had public transit available within a quarter mile, which employees and patrons could use.

PARKING SURVEY INFORMATION

Of the 12 facilities examined, two were in an urban location, 10 were in a suburban location and no facilities were in a rural location.

The adult fitness centers were surveyed between the years of 2003 and 2004 in Monroe County, New York. In all cases the peak parking demand occurred in the evening between 4:00 p.m. and 7:00 p.m. Weekend parking lot counts were deemed inappropriate based on facility questionnaires completed by facility owners and/or managers. Three managers stated that fitness enthusiasts are more likely to workout in the beginning of the week and taper off towards the end of the week.

FACILITY OBSERVATION

Comments from facility questionnaires for adult fitness centers revealed that three of the twelve sites described a shortage of parking as a problem. Five of the twelve sites revealed that due to their location within a shopping center/plaza, they have plenty of room for overflow parking. Facility questionnaires also cited security, lighting, and the fact that fitness classes often overlap as concerns. Parking observers noted that five of the twelve sites surveyed had very light striping on the parking lots.

STATISTICAL ANALYSIS

The Data Plot and Equation chart shows the peak observed occupied parking spaces relative to the gross square footage of each adult fitness center. The chart includes a line for the best fit linear relationship calculated of 3.52 spaces plus 3.30 spaces per 1,000 square feet. The R^2 value of 0.61 demonstrates statistically that this is a good fit to the data. The chart also shows the high rate (1 space per 142 square feet) and the common standard for this land use among Monroe County municipalities (1 space per 100 square feet). Both of these rates extend further from the actual data points as the size of the observed fitness centers increase.

VARIABLES EXAMINED

Variables examined included tests of various functional forms of the facility size, but did not otherwise introduce new variables into the equations. Membership was deemed inappropriate as a basis for developing a parking standard as the number fluctuates greatly depending on short-term special offers and other factors.

CONCLUSIONS

The observations and analysis suggest that the parking demand grows at a fairly slow rate relative to the size of the facility. This is not as significant as it would be for community fitness centers, however, as even the largest adult fitness center observed is less than 40,000 square feet.

The most common standard of 1 parking space for every 100 square feet is excessive for all of the adult fitness centers, regardless of the size. A more reasonable standard would be 1 parking space per 140 square feet. This is just above the highest rate observed.

Common Standard:	1 space per 100 sq. ft.
Survey result:	1 space per 140 sq. ft.

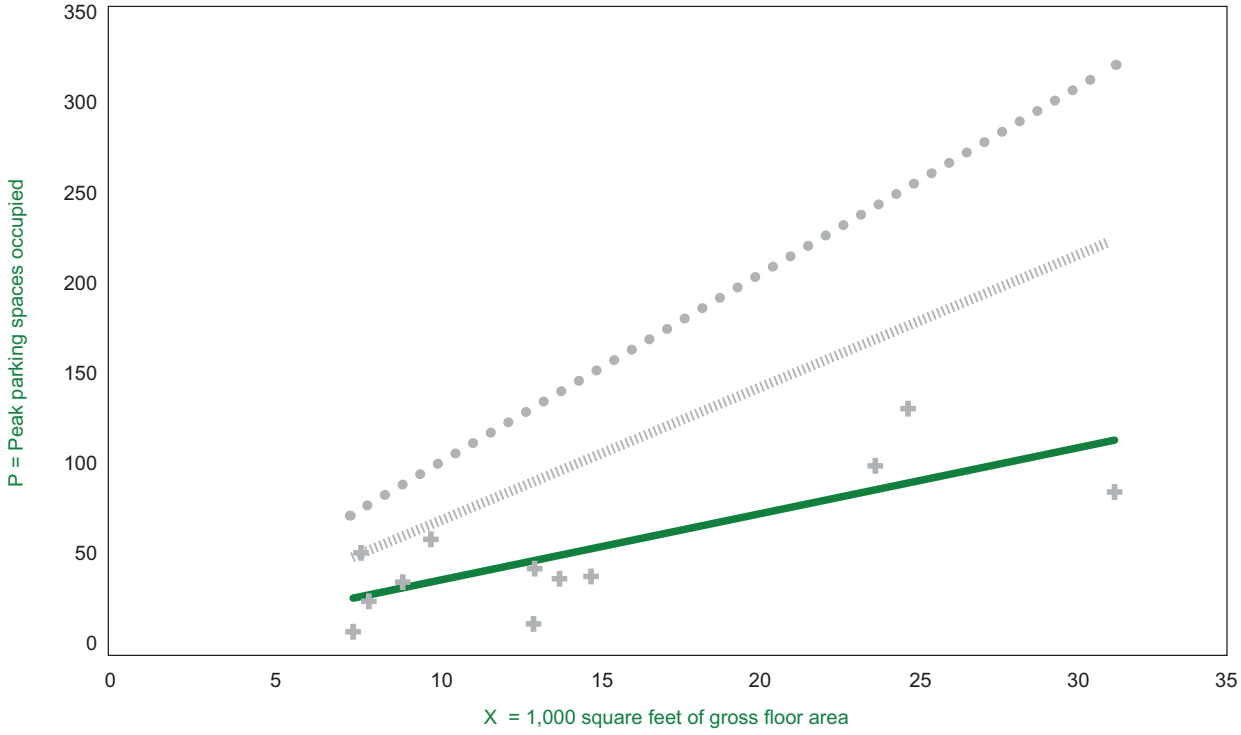
FITNESS CENTERS, ADULT

PEAK PARKING SPACES OCCUPIED VS: SQUARE FEET OF GROSS FLOOR AREA

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. SQUARE FEET GFA
3.74 spaces per 1,000 sq. ft. of gross floor area	1.29 - 7.05	4.63	1.71	12	14,857
1 space per 267 sq. ft. of gross floor area	142 - 775	174	178		

DATA PLOT AND EQUATION



LEGEND			
Actual Data Points	Best Fitted Relationship	High Rate	Common Standard (1 Space per 100 Sq. Ft.)

FITTED LINEAR EQUATION: P= 3.524(X) + 3.295 R^2 = 0.61

V-12. FITNESS CENTERS, COMMUNITY

LAND USE DESCRIPTION

Community fitness centers are private membership facilities or not-for-profit membership facilities used for athletic and general recreation activities for adults and children.

FACILITY INFORMATION

The nine facilities surveyed ranged in size from 8,012 square feet to 157,625 square feet. Six of the centers were under 30,000 square feet, while the other three were relatively large, each with over 100,000 square feet. The measured square footage represents enclosed facilities and does not include any added space such as for outdoor tennis courts or fields. All the buildings are freestanding. Most of the facilities included in the analysis had fitness classes and a pool. Around half provided day care service and enclosed courts for squash and tennis.

Seven of the sites surveyed had public transit available within a quarter mile, which employees and patrons could use.

PARKING SURVEY INFORMATION

Of the nine facilities examined, three were in an urban location, six were in a suburban location, and no facilities were located in a rural location.

The community fitness centers were surveyed between the years of 2003 and 2004 in Monroe County, New York. In most cases, the peak parking demand occurred in the evenings from 4:30 p.m. to 7:30 p.m. Weekend parking lot counts were deemed inappropriate based on facility questionnaires completed by facility respondents.

FACILITY OBSERVATION

Comments from facility questionnaires for community fitness centers revealed that snow can be a considerable problem for this land use. The busiest time of the year for Community Fitness Centers is within the winter months of December through March. Due to one facility's dense location, the manager told us he trucks his snow to an off-site location for storage. Another concern cited on facility questionnaires was pedestrian safety.

Parking observers verified snow piles often took up parking spaces and covered pavement markings which disturbed traffic flow and confused patrons. Observers confirmed that some parking lots were dark, offered no means to slow down drivers, and did not provide for pedestrian crossings.

STATISTICAL ANALYSIS

The Data Plot and Equation chart shows the peak observed occupied parking spaces relative to the gross square footage of each community center. The chart includes a best fit linear relationship to the data, as well as lines showing the high rate of parking demand and the most common standard now used by Monroe County municipalities.

All of the actual data points fall very close to the best fit linear relationship of 15.35 spaces plus 1.56 spaces per 1,000 square feet. The R^2 value of 0.94 is very close to 1.0, thus demonstrating the strength of this relationship. The chart also shows the high rate (1 space per 229 square feet) and the most common standard for this land use among Monroe County municipalities (1 space per 100 square feet). Both of these rates extend further from the actual data points as the size of the observed community centers increase.

VARIABLES EXAMINED

Variables examined included tests of various functional forms of the facility size, but did not otherwise introduce new variables into the equations. Membership was deemed inappropriate as a basis for developing a parking standard as the number fluctuates greatly month to month.

CONCLUSIONS

The observations and analysis suggest that the rate of parking demand for the largest centers (those over 100,000 square feet) is much lower than the rate of demand for the smaller centers (those under 30,000 square feet). This reflects the type of activities that the different centers provide. Enclosed tennis courts, for example, require a lot of square footage, but generally only serve two or four people at a time. Racquetball courts, and fitness classes serve more people in smaller spaces, and this corresponds to higher parking demands per square foot.

The analysis suggests that policymakers consider the expected uses of the community fitness center in determining the number of parking spaces needed. In the absence of any information other than total enclosed square footage, however, a standard of one space per 100 square feet is too high for the largest facilities. For community fitness centers under 50,000 square feet, a rate of 1 parking space per 400 square feet seems more reasonable. For larger centers (those over 50,000 square feet) a parking standard of 50 spaces *plus* 1.5 spaces for every 1,000 square feet (1 space per 667 square feet) appears sufficient to meet peak demand.

Common Standard:	1 space per 100 sq. ft.
Survey Result:	<50,000 sq. ft. = 1 space per 400 sq. ft. >50,000 sq. ft. = 1 space per 667 sq. ft.

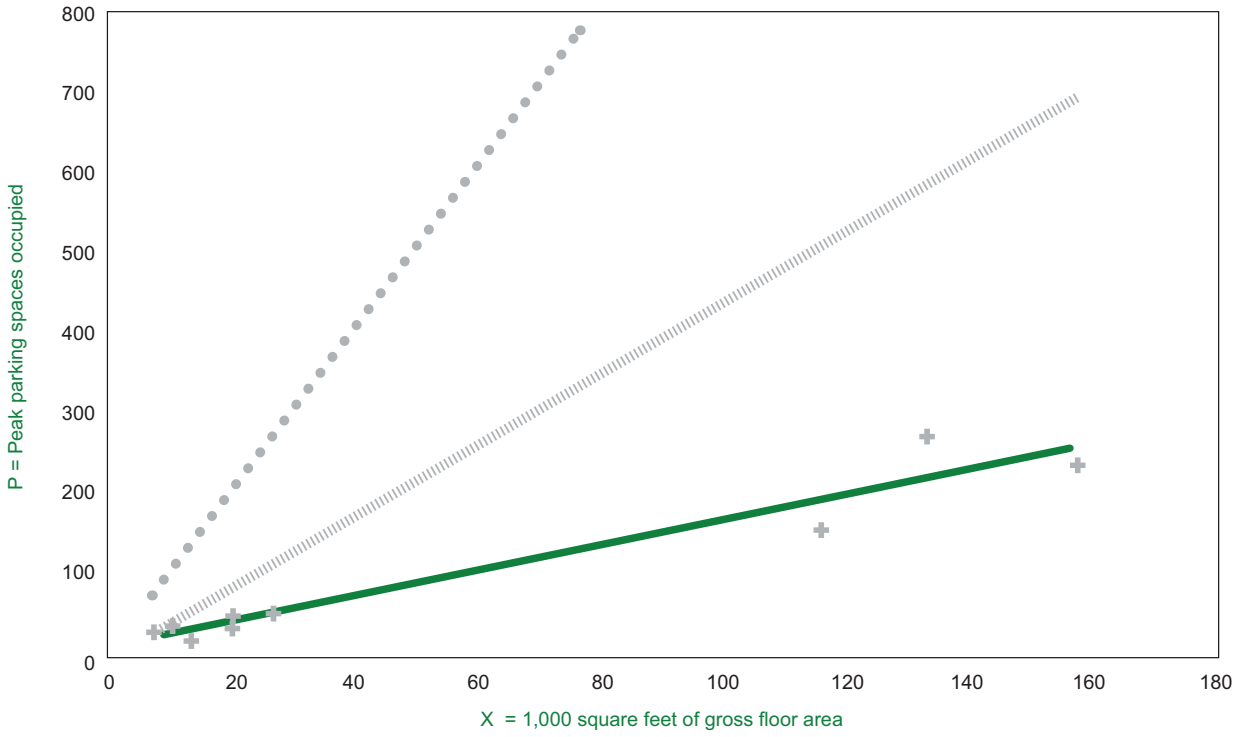
FITNESS CENTERS, COMMUNITY

PEAK PARKING SPACES OCCUPIED VS: SQUARE FEET OF GROSS FLOOR AREA

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. SQUARE FEET GFA
1.83 spaces per 1,000 sq. ft. of gross floor area	1.39 - 4.37	3.45	0.99	9	56,538
1 space per 545 sq. ft. of gross floor area	229 - 716	445	161		

DATA PLOT AND EQUATION



LEGEND			
Actual Data Points	Best Fitted Relationship	High Rate	Common Standard (1 Space per 100 Sq. Ft.)

FITTED LINEAR EQUATION: P= 1.562(X) + 15.345 R^2 = 0.94

V-13. FUNERAL HOMES

LAND USE DESCRIPTION

Funeral Homes are facilities used for preparation of the deceased for viewing, memorial services, burial or cremation and in some cases reception areas.

FACILITY INFORMATION

The six facilities surveyed had from two to five parlors for viewing of the deceased. None of the facilities had a crematory. The size of the *public area* (casket selection, chapel, family grieving area, family room, parlors and reception area) ranged in size from 2,300 square feet to 10,780 square feet. Three of the facilities also included a residence although the square footage of the residence was not included in the analysis. It should be noted that the actual size of the facility may be much larger than the public area, particularly if the building also includes a residence.

Four sites surveyed had public transit available within a quarter mile, which employees and mourners could use.

PARKING SURVEY INFORMATION

Five of the sites surveyed were located in a suburban location and one was in an urban location.

The funeral homes were surveyed between the years of 2002 and 2004 in Monroe County, New York. Several of the funeral homes had parking counts on more than one day**.** In all cases the peak parking demand occurred between 5:30 p.m. and 8:00 p.m.

FACILITY OBSERVATION

Many of the funeral homes in the sample did not have striped parking. A funeral director said that this allows them to have different configurations in the lot for calling hours or for a funeral procession. In addition, funeral homes will often, if not always, hire parking attendants to park the vehicles when striping is not present. The parking attendants directed motorists where to park and exit, in addition to double-parking vehicles when the lot was becoming full. One of the facilities had just enlarged their parking area to accommodate additional vehicles. One facility manager commented that a lack of parking requires them to divert vehicles to a public parking area.

STATISTICAL ANALYSIS

The Data Plot and Equation chart shows the relationship between peak occupied parking spaces relative to the square footage of the *public area* of the funeral home facilities. The non-public area (any residence, or body preparation areas) do not generate traffic as a function of the square footage, and were thus not considered as factors in the determination of parking demand.

The chart shows the best fit linear relationship for the peak occupied parking spaces as a rate of 15.3 parking spaces per 1,000 square feet of public area in the facility less a constant of 12.79 spaces. At this rate, we would expect a facility of 6,000 square feet of public space to generate 79 occupied parking spaces. The average rate of peak parking demand at the observed facilities was 1 parking space per 76.2 square feet of public area, with an observed range of 53.0 to 136.6 square feet of public area. The statistical analysis also included 14 non-linear transformations of square footage and peak parking demand. The exponential form did lead to a higher R^2 (thus indicating a better fit to the data), but the improvement is too small to suggest this more complicated form as a better standard.

Lines on the chart present the best fit relationship, and the high rate among the observed facilities. There is no standard code among Monroe County municipalities for this land use; the chart shows what is close to an average rate among the municipal codes: 1 space per 50 square feet.

VARIABLES EXAMINED

While characteristics of the deceased are the biggest determinants of funeral home parking demand, they are not potential factors in the development of a funeral home parking standard, and thus were not considered in the statistical analysis. The size of the full funeral home facility including the residence and the body preparation areas was considered but rejected as a poor indicator of parking demand from both a statistical and common sense perspective.

CONCLUSIONS

Funeral homes are an unusual land use in terms of parking because the number of visitors and thus the demand for parking spaces varies significantly from day to day. The untimely death of a particularly popular community leader, for example, would draw a much larger crowd of mourners than would the death of an elderly person whose mourners come mostly from the immediate family. This does have a relationship to the facility size in that the community leader's family would choose the area's largest facility with the biggest parlor, and largest parking supply-as the site for the funeral. However, the funeral home that can handle the largest group of mourners will also host funerals with very few expected visitors.

It is unclear whether the limited number of observations used in this study occurred during funerals with particularly high or particularly low numbers of mourners. The data suggests, however, that a parking standard of 1 space per 50 square feet would be reasonable.

Common Standard:	1 space per 50 sq. ft.
Survey Result:	1 space per 50 sq. ft.

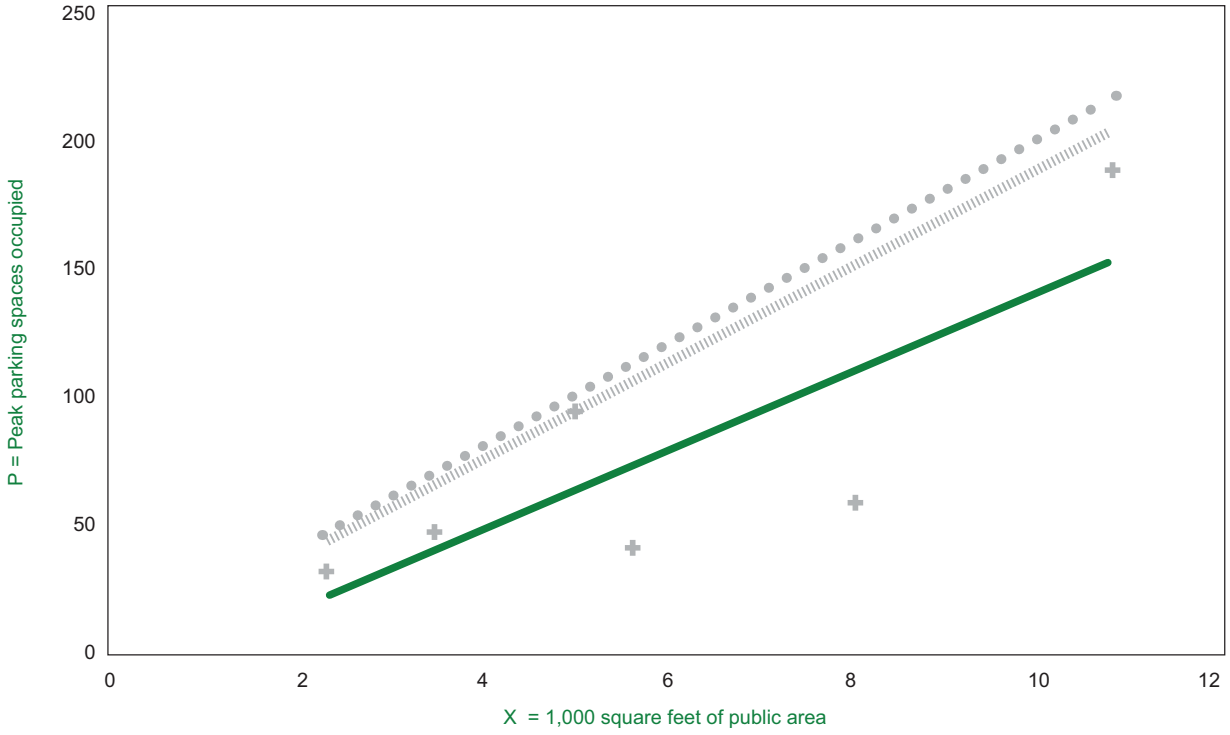
FUNERAL HOMES

PEAK PARKING SPACES OCCUPIED VS: SQUARE FEET OF PUBLIC AREA

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. SQUARE FEET PUBLIC FLOOR AREA
13.12 spaces per sq. ft. of public area	7.32 - 18.86	17.13	4.88	6	5,888
1 space per 76.2 sq. ft. of public area	53.0 - 136.6	44.9	38.1		

DATA PLOT AND EQUATION



LEGEND			
Actual Data Points	Best Fitted Relationship	High Rate	Common Standard (1 Space per 50 Sq. Ft.)

FITTED LINEAR EQUATION: P= 15.299(X) - 12.787 R^2 = 0.65

V-14. HOME IMPROVEMENT STORES

LAND USE DESCRIPTION

Home improvement stores engage in the retail sale of lumber and a wide variety of materials related to home maintenance, repair, and remodeling. This includes various basic hardware lines, such as tools, construction hardware, along with home appliances, paint, fixtures, and garden supplies. These stores offer how to advice, contractor services, delivery, design services, and installation services. Lumber and/or garden supplies may be stored in the main building or in a yard or an adjacent storage shed.

FACILITY INFORMATION

The nine facilities surveyed ranged in size from 42,420 square feet to 125,205 square feet. All of the stores used in this analysis were located in shopping plazas. No national home improvement stores were included in the analysis.

All nine of the sites surveyed had public transit available within a quarter mile, which employees and customers could use.

PARKING SURVEY INFORMATION

All nine facilities surveyed were located in suburban locations.

Most facilities use from 16 to 96 parking spaces to sell nursery stock in the spring and summer months and trees during the holidays.

The home improvement stores were surveyed between the years of 2002 and 2004 in Monroe County, New York. In most cases the peak parking demand occurred on a weekend day between 12:00 p.m. and 2:00 p.m. The few that peaked on a weekday occurred from 1:30 p.m. to 4:00 p.m.

FACILITY OBSERVATION

Comments from facility questionnaires for home improvement centers revealed that one facility described a shortage of parking during peak seasons (April-July) as a problem.

Parking observers noted that five of the nine facilities had parking spaces designated for the sole purpose of selling nursery stock. These parking spaces were surrounded by a temporary fence that could expand or condense the nursery stock area as needed. It is unclear if using parking spaces for selling nursery stock is the result of not having enough retail space or for the sake of convenience to customers.

STATISTICAL ANALYSIS

The Data Plot and Equation chart shows the relationship between observed peak occupied parking spaces and the square footage of respective home improvement stores. Of the nine stores observed, eight have an observed peak parking close to a relatively flat line. One of the observations deviates far above the values for the other stores. No unique characteristic of this observation was identified to explain this deviation. Based on the full set of observations and as measured by the t-statistic for the variable, square footage is *not* a statistically significant determinant of home improvement store peak parking demand. This is also evident in the goodness of fit measure (R^2) for the best fit equation. The value of 0.07 indicates a very weak relationship between square footage and parking demand.

The chart also shows the high rate observed (1 space per 390 square feet of gross floor area), and a common standard for home improvement facilities within Monroe County municipalities (1 space per 200 square feet). A perfect fit would have an R^2 absolute value of 1.0.

VARIABLES EXAMINED

The variables examined included tests of different functional specifications of square footage. None offered an improved fit beyond that of the linear relationship. Day of week does appear to influence parking demand. Of the nine facilities in the sample, five had parking counts on both weekdays and weekends. The weekend counts at four of these five were 11 to 43 percent higher than the weekday counts at the respective stores. The fifth observation had a 13 percent higher count on the weekday. The analysis otherwise considered the highest observed parking demand at each of the nine stores. It should be noted that all nine observations are from suburban stores of the same company and that this company went out of business a number of years after the observations were completed.

CONCLUSIONS

The analysis does not reveal that a home improvement store's square footage is a good basis for determining the parking supply. A standard now used by several area municipalities, 1 parking space per 200 square feet, seems excessive, particularly so for stores over 80,000 square feet. Rather, the data suggests a flat 200 parking space standard for home improvement stores between 50,000 and 130,000 square feet.

Common Standard:	1 space per 200 sq. ft.
Survey Result:	50,000 sq. ft. to 130,000 sq. ft. = Fixed number of 200 spaces

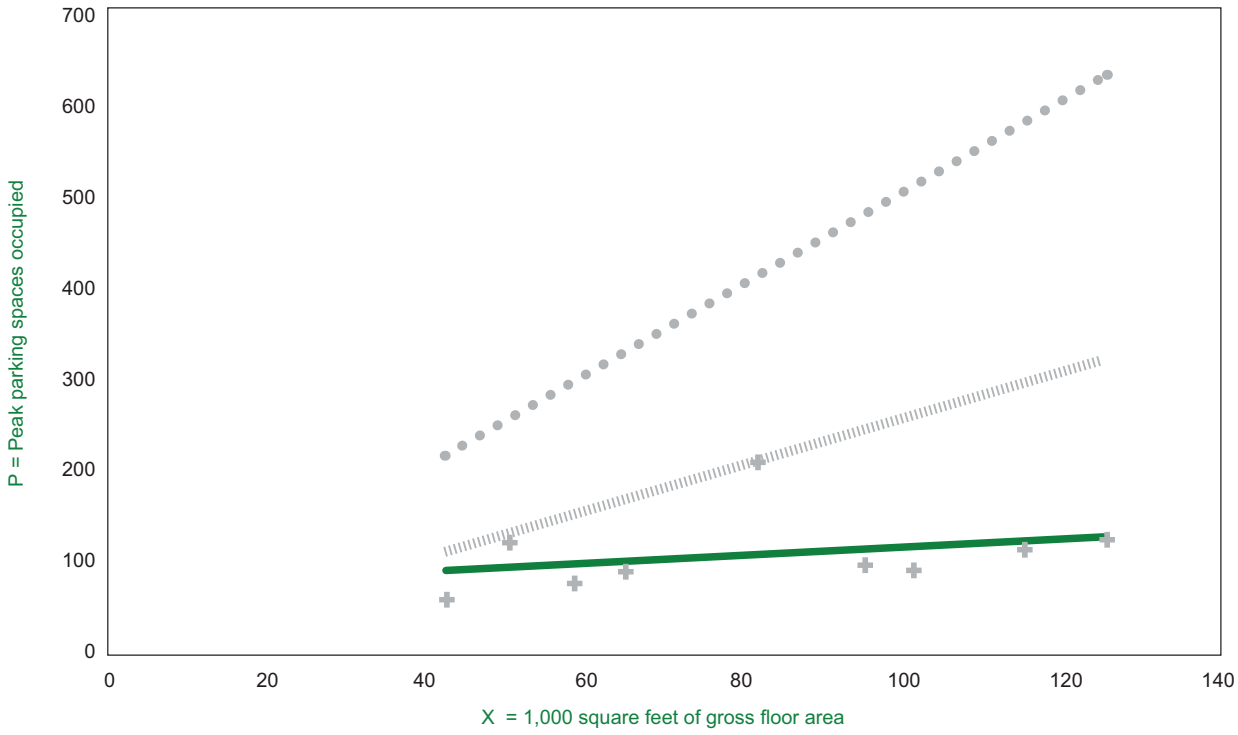
HOME IMPROVEMENT STORES

PEAK PARKING SPACES OCCUPIED VS: SQUARE FOOTAGE

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. SQUARE FEET GFA
1.31 spaces per 1,000 sq. ft. of gross floor area	.86 - 2.85	1.70	0.62	9	81,575
1 space per 760 sq. ft. of gross floor area	1,160 - 390	590	274.3		

DATA PLOT AND EQUATION



LEGEND			
Actual Data Points	Best Fitted Relationship	High Rate	Common Standard (1 Space per 150 Sq. Ft.)

FITTED LINEAR EQUATION: P= 0.403(X) + 73.872 R^2 = 0.07

V-15. HOTELS

LAND USE DESCRIPTION

Hotel facilities provide transient sleeping accommodations with associated lodging services for a fee.

FACILITY INFORMATION

The nine facilities surveyed ranged in size from 38,958 square feet to 73,030 square feet and have a range of 66 to 148 rooms. The hotels included in this analysis did not provide significant restaurant, conference or banquet facilities. Options may include single rooms, efficiencies and suites with access primarily from interior lobbies, courts, or halls.

PARKING SURVEY INFORMATION

All 9 facilities were in a suburban location. All facilities surveyed had public transit within a quarter mile for employees and customers to use.

The hotels were surveyed between the years of 2003 and 2004 in Monroe County, New York. In most cases, the peak parking demand occurred in the mornings from 6:00 a.m. to 9:50 a.m. In addition to recording the peak parking demand, observers also recorded the total number of guest rooms occupied. On average, the hotels were 61 percent occupied during the counts, with a range of 29 to 91 percent occupied.

FACILITY OBSERVATION

Only one facility manager reported a shortage of parking. Parking lot observations revealed that on one site the parking lot was so full that a parking attendant was directing vehicles to offsite municipal lots. Another site was noted for having all the handicap spaces occupied throughout the observation.

STATISTICAL ANALYSIS

The attached chart shows the peak observed occupied parking spaces relative to the number of rented guest rooms. It includes a best fit linear relationship to the data, as well as lines showing the high rate of parking demand and the common standard now used by Monroe County municipalities.

The chart also shows the best fit statistical relationship for peak occupied spaces as a function of the occupied rooms. The “goodness of fit” measure (R^2) of .77 confirms that there is a strong statistical relationship between occupied rooms and the number of vehicles parked.

VARIABLES EXAMINED

In addition to testing occupied rooms and the square footage as individual determinants of peak parking demand, the joint effect of the occupied rooms *and* square footage on parking demand were also examined. This has a minimal impact on the overall strength of the square footage model alone. In the presence of the square footage variable, the number of occupied rooms is not statistically significant. (The t-statistic for the occupied room variable is - 0.07)

CONCLUSIONS

For a hotel that offers nothing more than overnight accommodations, a parking standard based solely on the total number of guest rooms seems reasonable. The observations suggest that, for these hotels, a rate of 1.2 parking spaces per rentable guest room would be sufficient to meet peak parking demand.

Hotels, however, are often more than just a place to spend the night. The presence of banquet and meeting rooms, restaurants, and fitness facilities, can generate parking demands at a much greater rate than the number of guest rooms alone would suggest. For these hotels, the parking demand rate should account for these added uses, although in any case there would be some overlap of demand. For example many of the people who park to use a restaurant, or attend a convention, are the *same* people who park to stay overnight.

Common Standard:	1 space per room
Survey Result:	1 space per 0.8 rentable hotel guest room

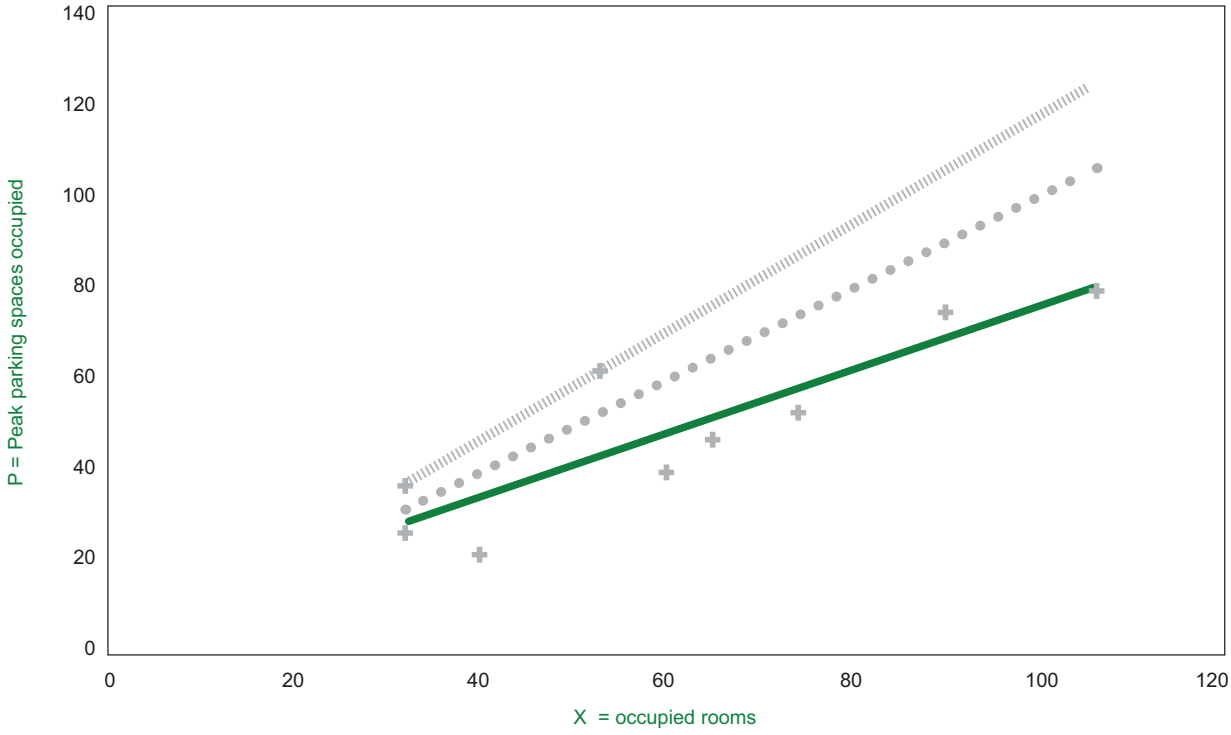
HOTELS

PEAK PARKING SPACES OCCUPIED VS: NUMBER OF OCCUPIED GUEST ROOMS

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. NUMBER OF OCCUPIED GUEST ROOMS
.80 spaces per occupied room	.55 - 1.17	1.86	.21	9	61
1 space per 1.25 occupied rooms	.85 - 1.82	1.06	.30		

DATA PLOT AND EQUATION



LEGEND			
Actual Data Points	Best Fitted Relationship	High Rate	Common Standard (1 Space per 1 Room)

FITTED LINEAR EQUATION: P= 0.688(X) + 6.891 R^2 = 0.77

V-16. INDUSTRIAL FACILITIES

LAND USE DESCRIPTION

Industrial facilities are involved in one or more of the following activities: manufacturing, designing, assembling, and/or converting a raw material into a finished product or processing a product. More than three quarters of the sites used in the survey were manufacturing facilities.

FACILITY INFORMATION

The 34 facilities surveyed ranged in size from 5,000 square feet to 360,740 square feet. The employees for first shift, which was the largest shift for all the industrial facilities, ranged from 10 employees to 900 employees and second shift ranged from 6 employees to 207 employees.

Twenty seven of the facilities surveyed had public transit within a quarter mile, which employees and visitors could use.

PARKING SURVEY INFORMATION

Of the 34 facilities examined, 10 were in an urban location, 23 were in a suburban location, and one was in a rural location.

The industrial facilities were surveyed between the years of 2001 and 2003 in Monroe County, New York.

Observers made parking lot counts during the shift change for facilitates that had a first and second shift on weekdays. Analysis of facility questionnaires indicated that this land use typically requires the highest number of parking spaces on weekdays during the first and second shift change time frame, due to the overlap in these two shifts. Of the 34 facilities surveyed 21 had more than one shift and 13 had a single shift. In all cases for facilities with more than one shift the peak parking demand occurred in the evening from 2:15 p.m. to 4:00 p.m.

FACILITY OBSERVATION

Comments on facility questionnaires revealed that one facility planned to enlarge their parking lot soon and another facility stated a problem with a nearby creek flooding in the spring which causes areas of the parking lot to flood. One facility manager stated that many employees use the bus to get to work.

Parking observers noted that three sites had more than one tenant. These sites also designated parking for each tenant. Observations also revealed that parking lots were used for storage of delivery trucks, scrap metal, equipment sheds and several dumpsters.

STATISTICAL ANALYSIS

The Data Plot and Equation charts show the peak occupied parking spaces as a function of two criteria:

- Number of employees on the peak shift; and,
- Square footage of gross floor area of the facility.

The chart includes a best fit linear relationship to the data, as well as lines showing the high rate of parking demand and the most common standard of 1 space per employee or 1 space per 400 square feet now used by Monroe County municipalities. The best fit curve, derived through a regression analysis, is a simple linear relationship for both the employee and the square footage equations.

The formula based on peak shift employees is very strong as evident by the goodness of fit measurement (R^2) of 0.98. The formula based on square footage of the facility is not as strong with an R^2 of 0.67. A measure of 1.0 would indicate a perfect linear relationship between peak shift employees or square footage and industrial facilities' peak parking demand.

VARIABLES EXAMINED

A few Monroe County municipalities use a parking standard for industrial facilities based on the number of employees and on the size of the facility. The analysis did test various data transformations and other functional forms. Some of these did yield slightly better statistical fits than did the simple linear models, but the improvement was too small to make it worth the added complexity in the equations.

CONCLUSIONS

The model provides a very good fit based only on the number of employees, and the analysis reveals that industrial facilities almost uniformly fill about 0.9 parking spaces for every 1 employee. Absences, carpooling, and transit may account for the difference. Given the different uses and potential reuse of an industrial facility, however, policymakers may also want to consider a formula based on square footage of the gross floor area. When applied to all industrial facilities, this is a less precise measure than number of employees when applied to all industrial facilities.

The second chart shows most of the facilities are well below the current common standard of 1 space per 400 square feet of gross floor area. The analysis suggests that 0.9 parking spaces per peak shift employee or 1 space per every 600 square foot of gross floor area (whichever is larger) would be a reasonable standard for industrial facilities.

Common Standard:	1 space per employee or 1 space per 400 sq. ft. of GFA
Survey Result:	1 space per 1.1 peak shift employee or 1 space per 600 sq. ft. of GFA, whichever is greater

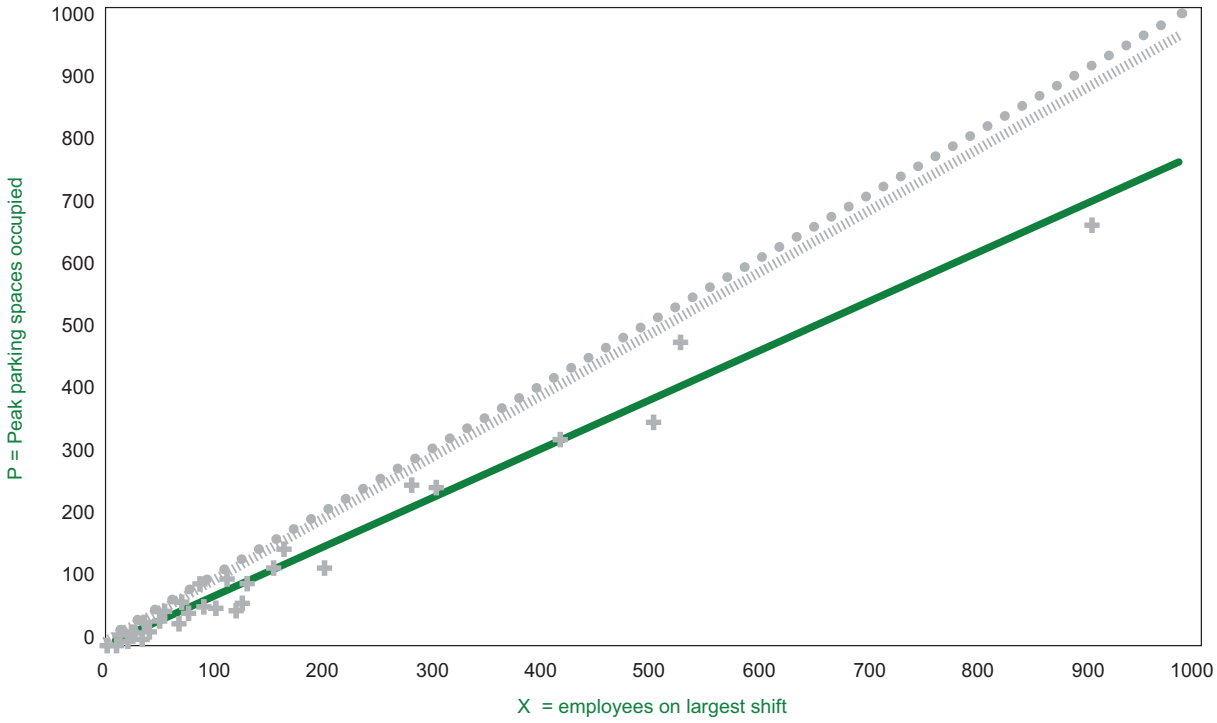
INDUSTRIAL FACILITIES

PEAK PARKING SPACES OCCUPIED VS: NUMBER OF EMPLOYEES ON PEAK SHIFT

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. EMPS. ON PEAK SHIFT
0.81 spaces per 1 peak shift employee	0.50 - 1.16	0.91	0.17	33	150
1 space per 1.23 peak shift employee	.86 - 2.00	1.15	.30		

DATA PLOT AND EQUATION



LEGEND			
Actual Data Points	Best Fitted Relationship	High Rate	Common Standard (1 Space per Employee)

FITTED CURVE EQUATION: P=0.76(X) + 7.05 R^2 = 0.98

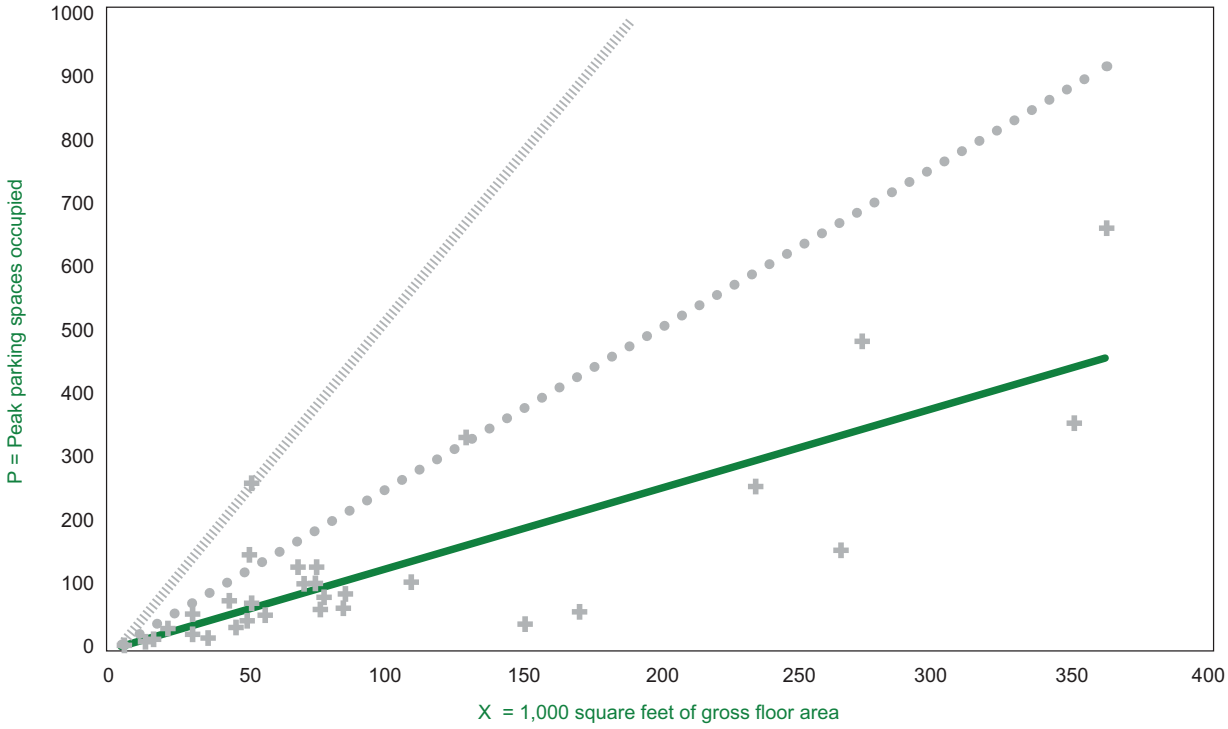
INDUSTRIAL FACILITIES

PEAK PARKING SPACES OCCUPIED VS: GROSS SQUARE FOOTAGE OF FACILITY

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. SQUARE FEET GFA
1.31 spaces per 1,000 sq. ft. of gross floor area	.30 - 5.16	1.17	.90	34	93,471
1 space per 764 sq. ft. of gross floor area	193 - 3,333	569	669		

DATA PLOT AND EQUATION



LEGEND			
Actual Data Points	Best Fitted Relationship	High Rate	Common Standard (1 Space per 400 Sq. Ft.)

FITTED LINEAR EQUATION: P=1.237(X) + 6.62 R^2 = 0.67

V-17. MARINA FACILITIES

LAND USE DESCRIPTION

Marina facilities are privately owned membership and non-membership facilities located on the waterfront primarily used for storing boats both on water and on land. This land use includes commercial marinas as well as private yacht clubs. Of the facilities used in this analysis, 4 included boat dealerships, three had small boating supply and gift shops and three sold fishing bait and tackle.

FACILITY INFORMATION

The 15 facilities surveyed accommodated between 10 to 400 boats on land and 26 to 300 in water. Six of the facilities were located on a river with access to Lake Ontario. Six facilities were located on bays with access to Lake Ontario. Three of the sites surveyed were located on Finger Lakes.

Three of the sites surveyed had public transit available within a quarter mile, which employees and customers could use.

PARKING SURVEY INFORMATION

Of the 15 facilities examined, one was in an urban location, seven were in suburban locations, and seven were in rural locations.

The marina facilities were surveyed between the years of 2003 and 2004 in Monroe County, Ontario County, Orleans County, Steuben County, Yates County and Cayuga County, New York. Observations were conducted on sunny or mostly sunny days during peak summer months on weekdays and weekends. In most cases the peak parking demand occurred on a Friday, Saturday or Sunday afternoon between 1:00 p.m. and 6:30 p.m.

FACILITY OBSERVATION

Four facility managers commented that their facilities' experienced problems with keeping the parking area organized. Specific problems listed were keeping vehicles aligned in the correct area, and not blocking access to marina equipment or launching areas. Another facility manager commented that close proximity of parking to the boats is important; however people parking in front of another person's boat is a frequent problem.

Many of the marina facilities in the sample did not have striped parking. Parking observers commented that most of the sites offered a combination of parking on gravel and grass. Only two sites within the study had paved parking areas. One site had a paved drop-off area near the boat slips with a grass parking area nearby.

Parking observers confirmed that some sites appeared to have haphazard parking. One observer noted that these issues could potentially be addressed through signage or using landscape features to define parking areas.

STATISTICAL ANALYSIS

The Data Plot and Equation chart shows the peak observed occupied parking spaces relative to the maximum number of boat slips available at each facility. Consideration must be given for parking generated by ancillary or multiple land uses occupying the same site as a marina. Land uses such as a large restaurant can increase the amount of parking required on site. Yacht clubs that have routine race events will need to provide overflow parking to accommodate these events.

VARIABLES EXAMINED

The variables examined included tests of various functional forms of the number of boat slips, and also sought to understand any effect on parking based on the presence of dry dockage, boat ramps, and other ancillary facilities. The addition of dry dockage did not add to the strength of the model in explaining peak parking demand. Tests on the effect of boat ramps were undermined by the lack of observed facilities without them. One variable, the presence of a restaurant clearly affected the number of peak parking spaces occupied, but the statistical analysis excluded these observations.

CONCLUSIONS

Under regular operating conditions, marinas and yacht clubs tend to generate parking demands of less than 0.7 occupied parking spaces per boat slip (1 space per 1.4 boat slips). For most of the facilities, a rate of 1 space per 2 or even 3 boat slips is sufficient, and compared to these rates a common standard of 1 parking space per 1 boat slip could be viewed as an excessive requirement.

There are, however, irregular conditions where marina and yacht club parking demands exceed even the 1 space per 1 boat slip standard. The weekly race night at one of the yacht clubs observed, for example, generated 85 filled parking spaces in relation to only 47 boat slips. This is a rate of 1.81 parking spaces per boat slip (or 1 space per 0.55 boat slips).

Policymakers should also recognize that marinas and yacht clubs can offer services beyond boat storage and docking. Three of the facilities observed (but not included in the statistical analysis) had restaurants; this situation can generate additional parking demand beyond what the number of boat slips alone would suggest. There should be consideration for additional parking when a restaurant is present and open to the public.

Common Standard:	1 space per boat slip
Survey Result:	.7 space per boat slip

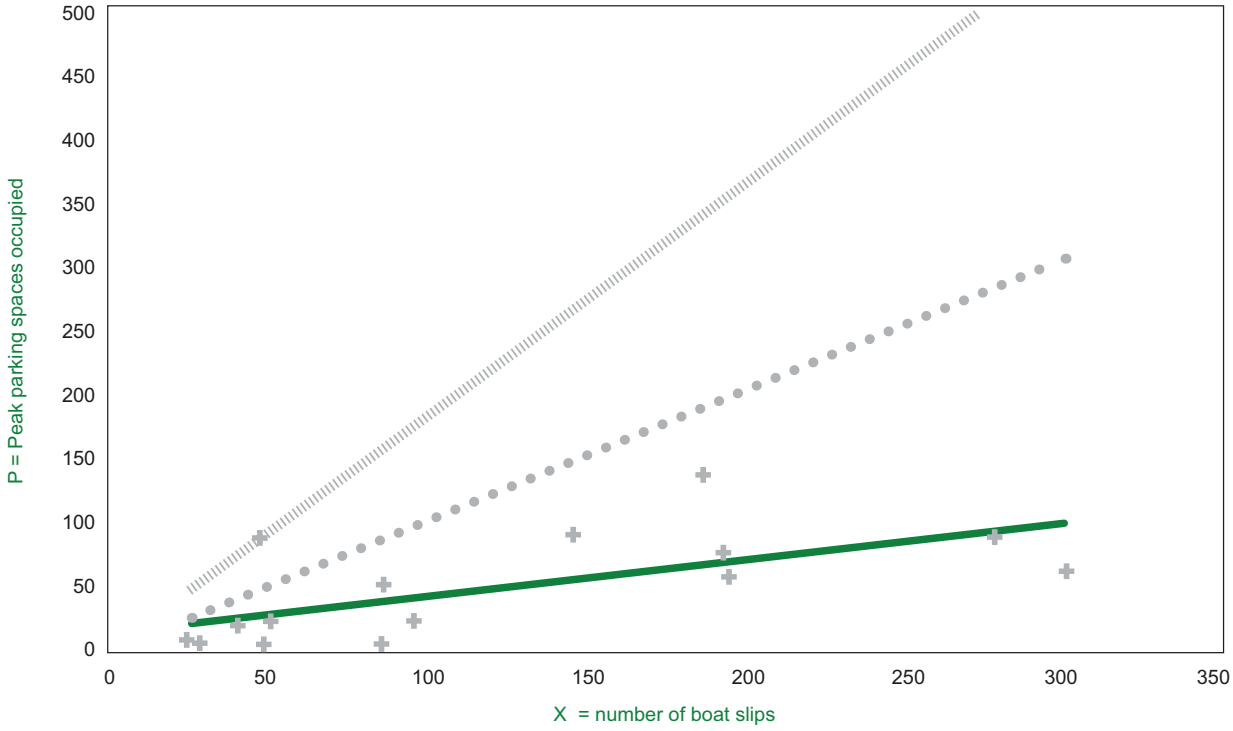
MARINA FACILITIES

PEAK PARKING SPACES OCCUPIED VS: NUMBER OF BOAT SLIPS

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. NUMBER OF BOAT SLIPS
.40 parking spaces per boat slip	.05 - 1.81	.59	.43	15	120
1 parking space per 2.51 boat slips	21.25 - 0.55	1.68	2.32		

DATA PLOT AND EQUATION



LEGEND			
Actual Data Points	Best Fitted Relationship	High Rate	Common Standard (1 Space per Boat Slip)

FITTED LINEAR EQUATION: P= 0.283(X) + 13.829 R^2 = 0.40

V-18. OFFICE BUILDINGS – SUBURBAN, GENERAL

LAND USE DESCRIPTION

A freestanding building that is primarily for use by professional or service companies in which the majority of the traffic generated comes from employees and not the general public. Nearly all of the sites included in this analysis were professional office space and almost half included some retail or commercial space.

FACILITY INFORMATION

The 42 facilities surveyed ranged in size from 1,400 square feet to 180,850 square feet. All but one of the office buildings were free standing. Thirty-eight of the buildings surveyed were within office parks which offered separate parking accommodations for each office building.

All facilities surveyed had public transit available within a quarter mile, which employees and visitors could use.

PARKING SURVEY INFORMATION

Forty one of the facilities examined were in suburban locations.

None of the offices are known to have had a parking supply below the level of natural parking demand and none are known to have constrained parking demand, such as through parking fees, parking restrictions, carpool incentives, or other vehicle reduction measures imposed on tenants or employees.

The general office buildings were surveyed in 2003 in Monroe County, New York. In all cases the peak parking demand occurred between 9:00 a.m. and 3:00 p.m. Weekend parking lot counts were deemed inappropriate based on facility questionnaires completed by facility owners and/or managers.

FACILITY OBSERVATION

Parking lot observation revealed that 11 of the 42 facilities had cars parked in the fire lane or in no parking areas at some point during the observation. Facility managers, facility owners and parking observers made no notations that there was a shortage in parking spaces available.

VARIABLES EXAMINED

The variables examined included tests of various functional forms of the square footage, but did not otherwise introduce new variables into the equations.

STATISTICAL ANALYSIS

The Data Plot and Equation chart shows the peak observed occupied parking spaces relative to the respective office facility's square footage. Square footage is a fairly good measure as evident by the goodness of fit measurement (R^2) of 0.78. A measure of 1.0 would indicate a perfect linear relationship between square footage and general office's peak parking demand.

The chart includes a line for a common standard of 1 space per 250 square feet. This is about the average parking standard found for offices among municipalities in Monroe County, although many of the standards also include a factor for employees. The one common standard shown on the chart is near the high rate found for the sample (1 space per 218.9 square feet), but is more than double the average rate of parking demand observed for the sample (1 space per 523.3 square feet).

CONCLUSIONS

The peak parking demand for "suburban office facilities" bears a strong positive relationship to the respective office's square footage. Based on a sample of offices in suburban Monroe County, peak parking demand rises at an average of 1.91 spaces per 1,000 square feet of gross floor area. The relationship is not exact; depending on the nature of the business, its profitability, or its lease arrangements, a business may create large offices or small offices due to need. Certain types of offices will also generate more visitor trips (or longer visitor stays) than would others. This too would influence the peak parking demand.

Given this variety of offices, policymakers aiming to ensure that the land use provides sufficient off-street parking may choose to adopt a standard based on square footage that also accounts for the variation in demand based on the size of the office. A rate of 1 space per 200 square feet for the first 20,000 square feet plus one space per 450 square feet for any additional square. This rate would be sufficient to meet the peak parking demand observed for all of the suburban offices in the sample.

Common Standard:	1 space per 250 sq. ft.
Survey Result:	1 space per 200 sq. ft. for the first 20,000 sq. ft., plus 1 space per 450 sq. ft. for any additional square footage over 20,000 sq. ft.

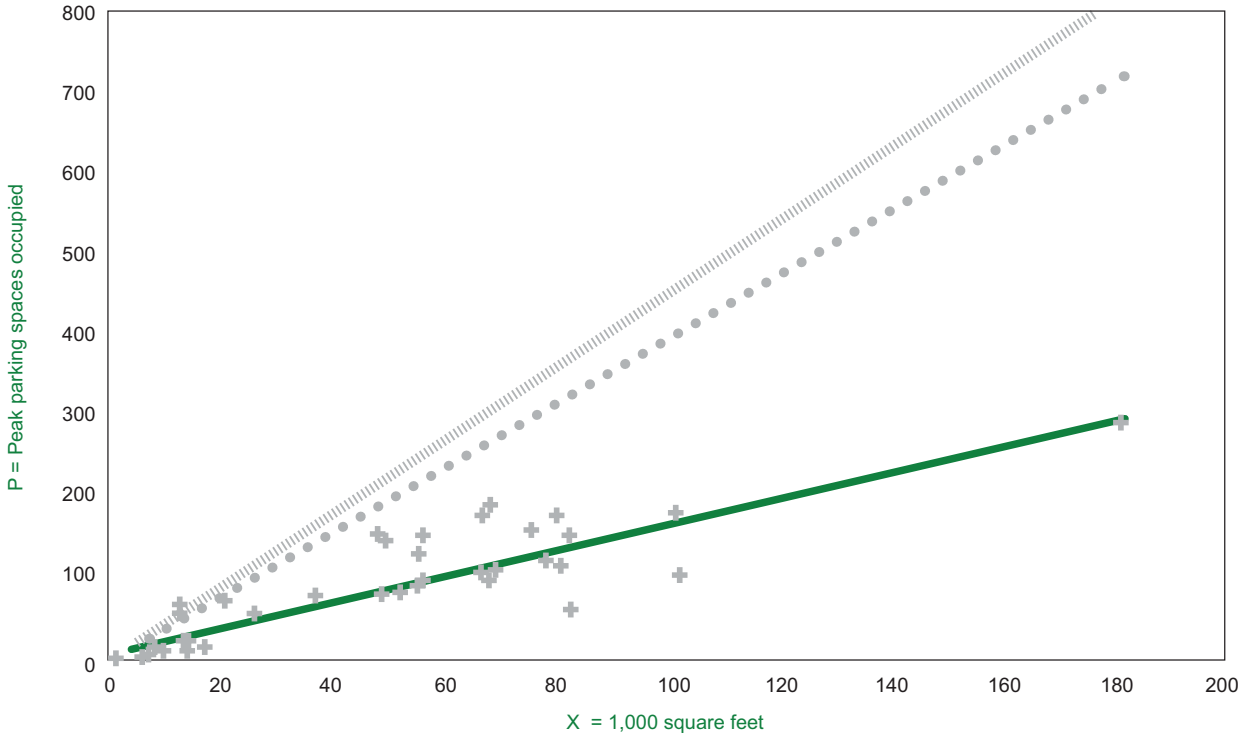
OFFICE BUILDINGS, SUBURBAN GENERAL

PEAK PARKING SPACES OCCUPIED VS: SQUARE FOOTAGE

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. SQUARE FEET GFA
1.91 spaces per 1,000 sq. ft. of gross floor area	.79 - 4.57	2.14	.87	42	49,449
1 space per 523.3 sq. ft. of gross floor area	218.9 - 1,268.4	463.7	224.3		

DATA PLOT AND EQUATION



LEGEND			
Actual Data Points	Best Fitted Relationship	High Rate	Common Standard (1 Space per 250 Sq. Ft.)

FITTED LINEAR EQUATION: P= 1.584(X) + 16.138 R^2 = 0.78

V-19. OFFICES, MEDICAL/DENTAL

LAND USE DESCRIPTION

Medical and dental offices are facilities operated by one or more physicians, dentists, or medical related companies for the examination and treatment of patients on an outpatient basis.

FACILITY INFORMATION

The 16 facilities surveyed ranged in size from 3,234 square feet to 67,000 square feet of gross floor area.

Thirteen of the sites surveyed had public transit available within a quarter mile, which employees and patients could use.

PARKING SURVEY INFORMATION

Six out of the sixteen facilities provided a combination of the following activities: laboratory services; x-ray; pharmacy; optical; urgent care; and nutritional services.

Of the 16 facilities examined, one was in an urban location, 15 were in a suburban location, and there were no sites in a rural location.

The medical and dental offices were surveyed between the years of 2001 and 2003 in Monroe County, New York. In all cases the peak parking demand occurred between the hours of 10:00 a.m. and 11:15 a.m. weekday mornings and from 2:30 p.m. to 3:45 p.m. on weekday afternoons.

FACILITY OBSERVATION

Respondents from two of the facilities commented on the facility questionnaires that they do not have an adequate number of handicap spaces to accommodate patients in need. Two other questionnaires showed that on some days they do not have enough parking.

Two facility respondents also reported concerns about the design of the parking areas. In one case, the parking area is at a steep incline which can be hazardous during inclement weather; in the other, patients parking in handicap parking spaces have to cross a traffic lane to get to the entrance to the building.

Two facility respondents had comments related to public transportation. One facility would like patients to be dropped at the door and the other would like service extended to their facility to better service their city patients.

STATISTICAL ANALYSIS

The Data Plot and Equation Chart and shows the peak occupied parking spaces as a function of the square footage of gross floor area of the facility. The best fit linear relationship for the 16 observations is a rate of 1 parking space for every 270 square feet of gross floor area. This indicates fewer parking spaces than the common standard of 1 space for every 200 square feet found in Monroe County municipalities. Gross square footage of medical and dental offices is a strong relationship as evident by the goodness of fit measurement (R^2) of 0.95. A measurement of 1.0 would indicate a perfect relationship.

VARIABLES EXAMINED

A few Monroe County municipalities include the number of employees or the number of doctors/dentists in their parking standards for the medical and dental facilities. Tests of these variables offered very weak and in some cases counter-intuitive results. A reasonable fit between peak parking spaces used and the number of employees (by type) and with or without the added variable of each facility's square footage could not be found.

CONCLUSIONS

The standard of 1 space for every 200 square feet of gross floor area seems reasonable to ensure a small surplus of spaces for most medical and dental facilities. A rate of 1 parking space for up to 270 square feet of gross floor area would still meet most facility parking needs. Note that the smallest medical facilities generate greater parking demands than these rates suggest.

Common Standard:	1 space per 200 sq. ft. of GFA
Survey Result:	1 space per 270 sq. ft. of GFA

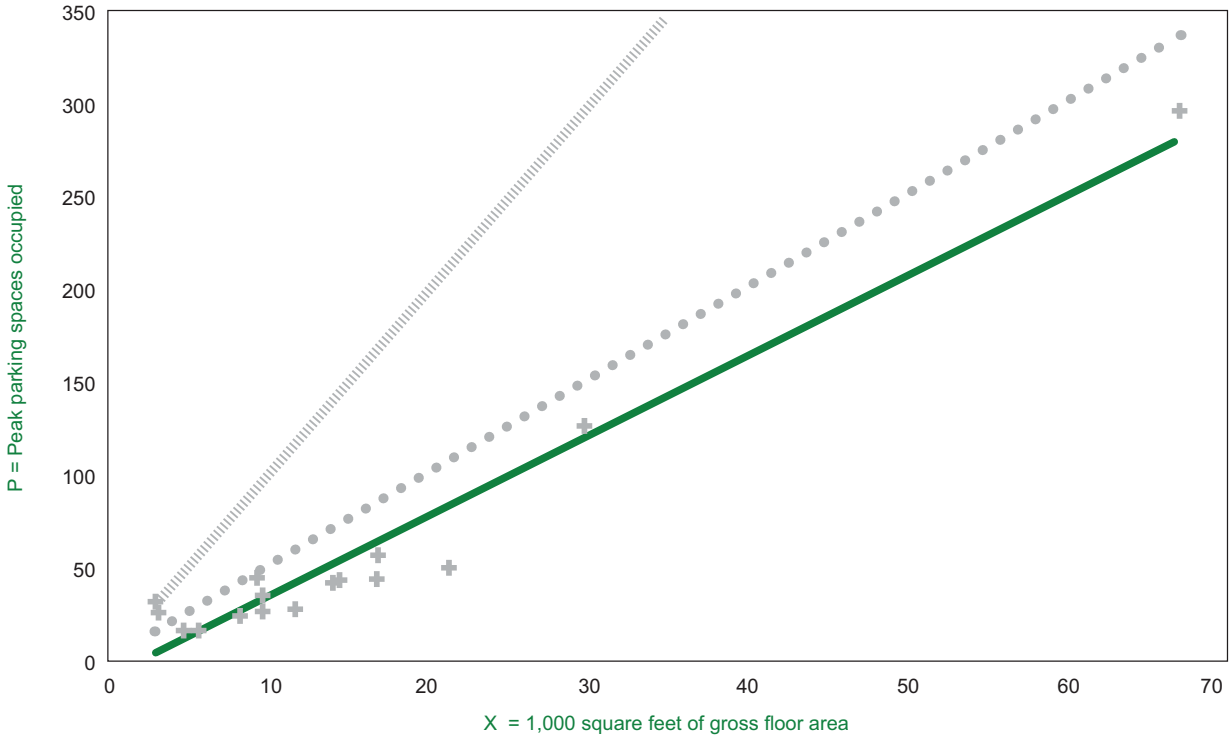
OFFICES, MEDICAL/DENTAL

PEAK PARKING SPACES OCCUPIED VS: GROSS SQUARE FOOTAGE OF FACILITY

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. SQUARE FEET GFA
3.69 spaces per 1,000 sq. ft. of gross floor area	2.30 - 9.89	4.69	2.16	16	15,491
1 space per 271 sq. ft. of gross floor area	101 - 435	229	95		

DATA PLOT AND EQUATION



LEGEND			
Actual Data Points	Best Fitted Relationship	High Rate	Common Standard (1 Space per 200 Sq. Ft.)

FITTED LINEAR EQUATION: P= 4.33(X) - 9.85 R^2 = 0.95

V-20. OFFICE PARKS – SUBURBAN

LAND USE DESCRIPTION

A group of freestanding office buildings used as offices for a profession, service, or industry that: has been planned, developed and operated under one common ownership or management whether or not located on the same lot; has one common arrangement for the maintenance of the grounds; shares parking areas; and is referred to under one common name. Of the sites included in the analysis most were professional offices. Approximately half of the sites had commercial, retail, or medical components.

FACILITY INFORMATION

The eight facilities surveyed ranged in size from 14,481 square feet to 669,385 square feet. The office parks surveyed were located in freestanding buildings under one common name.

All facilities surveyed had public transit available within a quarter mile, which employees and visitors could use.

PARKING SURVEY INFORMATION

All eight office parks were located in a suburban location.

The Office Parks were surveyed in 2003 in Monroe County, New York. In all cases the peak parking demand occurred between 10:00 a.m. and 3:00 p.m. Weekend parking lot counts were deemed inappropriate based on facility questionnaires completed by facility owners and/or managers.

FACILITY OBSERVATION

Facility respondents stated that they are concerned about tenants parking in visitor spaces and that there is room for overflow within the office park.

Parking observers noted that cars drove very fast within the office park which causes concern for safety, especially for vehicles exiting parking lots within the office park.

STATISTICAL ANALYSIS

The Data Plot and Equation chart shows the peak observed occupied parking spaces relative to the respective office park's square footage. These variables have an extremely strong relationship, as is evident by the goodness of fit measurement (R^2) of 0.97. A measure of 1.0 would indicate a perfect linear relationship between square footage and an office park's peak parking demand.

The chart also shows a best fit line and a line showing the common standard of 1 parking space per 250 square feet. One space per 250 square feet is about the average parking standard found for offices among municipalities in Monroe County, although many of the common standards also include a factor for employees.

VARIABLES EXAMINED

The variables examined included tests of various functional forms of the square footage, but did not otherwise introduce new variables into the equations.

CONCLUSIONS

The parking demand differences of individual offices tend to cancel out with the aggregation of these offices into much larger office parks. The result is a very strong relationship between the suburban office park square footage and the peak parking demand. The average rate of 1 space per 553.7 square feet falls within a relatively narrow band of the high and low rates observed for the full sample. Rounding off the high rate of 1 space per 400 square feet would likely be appropriate as a standard for suburban office parks.

Common Standard:	1 space per 250 sq. ft.
Survey Result:	1 space per 400 sq. ft.

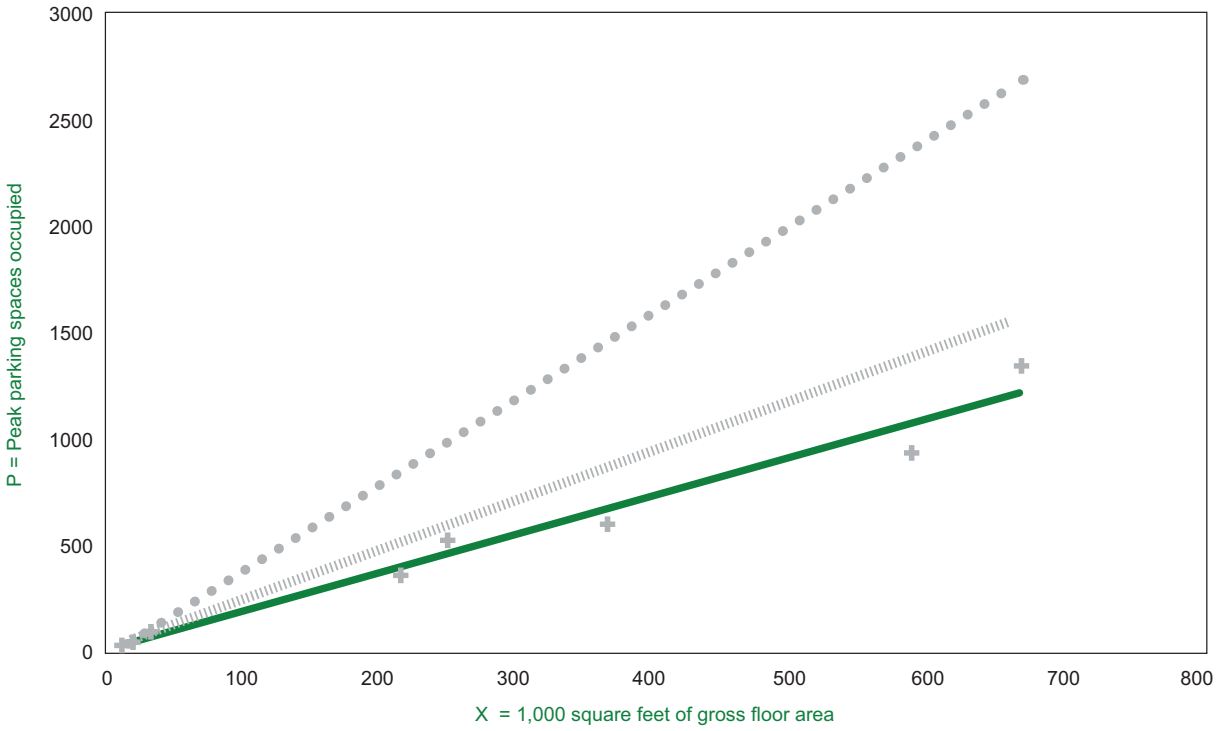
OFFICE PARKS, SUBURBAN

PEAK PARKING SPACES OCCUPIED VS: SQUARE FOOTAGE

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. SQUARE FEET GFA
1.81 spaces per 1,000 sq. ft. of gross floor area	1.45 - 2.34	2.01	.31	8	270,056
1 space per 553.7 sq. ft. of gross floor area	427.3 - 689.6	493.1	90.4		

DATA PLOT AND EQUATION



LEGEND			
Actual Data Points	Best Fitted Relationship	High Rate	Common Standard (1 Space per 250 Sq. Ft.)

FITTED LINEAR EQUATION: P= 1.819(X) + -3.743 R^2 = 0.97

V-21. PHARMACIES WITH A DRIVE THRU

LAND USE DESCRIPTION

Pharmacies are retail facilities that primarily sell prescription and over-the-counter medicine and associated products by means of a walk up counter or window designated to accommodate automobile traffic. The facilities also usually sell cosmetics, toiletries, stationary, personal care products, limited food products, film development and general merchandise. The drug stores in this category contain drive-through windows.

FACILITY INFORMATION

The 12 facilities surveyed ranged in size from 9,088 square feet to 14,758 square feet. All 12 sites were freestanding buildings.

Eleven of the sites surveyed had public transit available within a quarter mile, which employees and customers could use.

PARKING SURVEY INFORMATION

Of the 12 facilities examined, one was in an urban location, 11 were in a suburban location and there were no sites located in a rural location.

The pharmacies with a drive thru were surveyed between the years of 1999 and 2002 in Monroe County, New York. All facilities included in this study were part of a national chain. In all cases, the peak parking demand occurred between the hours of 5:00 p.m. and 6:45 p.m. on weekdays and between the hours of 11:15 a.m. and 1:00 p.m. on weekends.

FACILITY OBSERVATION

Parking lot observation revealed that all sites surveyed had minimal drive thru usage. Three of the twelve sites had cars parked in the fire lane or no parking area at some point throughout the observation. Two sites were reported as having a confusing traffic pattern. One site had many vehicles use the parking lot as a way to avoid the adjacent intersection.

STATISTICAL ANALYSIS

The Data Plot and Equation chart shows the relationship between the peak observed occupied parking spaces and the square footage of the respective stand-alone pharmacies. The charts include a line showing a 1 space per 200 square foot standard which is the most common standard found among parking regulations for basic retail in Monroe County. Municipalities in Monroe County do not have a separate standard for pharmacies. It is clear from the chart that the 1 space per 200 square feet standard is well above the rate found for the sample. The high rate observed of 1 space per 294 square feet, also appears as a line on the chart.

The best fit line to match the data is statistically weak. This is evident from the goodness of fit measure (R^2) which has a value of 0.04. The value for R^2 is in the range of 0 and 1, and the value of 0 means that pharmacy square footage is not at all a predictor of peak parking spaces occupied. It is also evident from the fact that the best fit line is negative.

The analysis based on this sample suggests that as facility size goes up, peak parking demand goes down. This negative relationship is likely a fluke of this sample and the days of the observation. It also reflects the relatively small variation in the size of the 12 facilities sampled. Eleven of the 12 are within about 2,000 square feet of one another. A slightly higher parking demand observed for the one facility over 14,000 square feet would have led to a positively-sloped best fit line.

VARIABLES EXAMINED

The variables examined tested various functional forms of pharmacy square footage. Whether the pharmacy was part of a national chain was not significant, and the data did not support further analysis into suburban or urban location.

CONCLUSIONS

This land use will need additional survey and analysis to determine the factors which effect parking demand. It is clear that building square footage is a weak indicator and that other factors have a more significant role in determining the amount of parking necessary for a given site. It should also be noted that the survey was done when drive thru facilities were just beginning to become popular for this land use. Recounting this land use now that drive thrus have become common may give better insight into the parking demand for this land use.

The amount of parking demand generated by a stand-alone pharmacy with a drive thru likely depends on factors such as the traffic on adjacent roads, the number of nearby households, the neighborhood median income, and the proximity of competitive stores. The size of the facility, however, is a comparatively insignificant predictor of peak parking demand. Part of this may reflect the fact that the facilities tend to be about the same size. With relatively little size variation, it is difficult to isolate the effect that size would have. At least for the facilities from 9,000 to 15,000 square feet, a standard of 1 parking space per 300 square feet should be sufficient to meet peak parking demands. The relationship is such that an alternative would be to use a set number of 30 parking spaces for a facility up to 15,000 square feet. Either way the distribution of observations makes any recommendation based on this data suspect because the smaller facilities appear to require more parking.

Common Standard:	*No common standard; basic retail most similar of 1 space per 200 sq. ft.*
Survey Result:	*1 space per 300 sq. ft. or a maximum of 30 spaces up to 15,000 sq. ft*

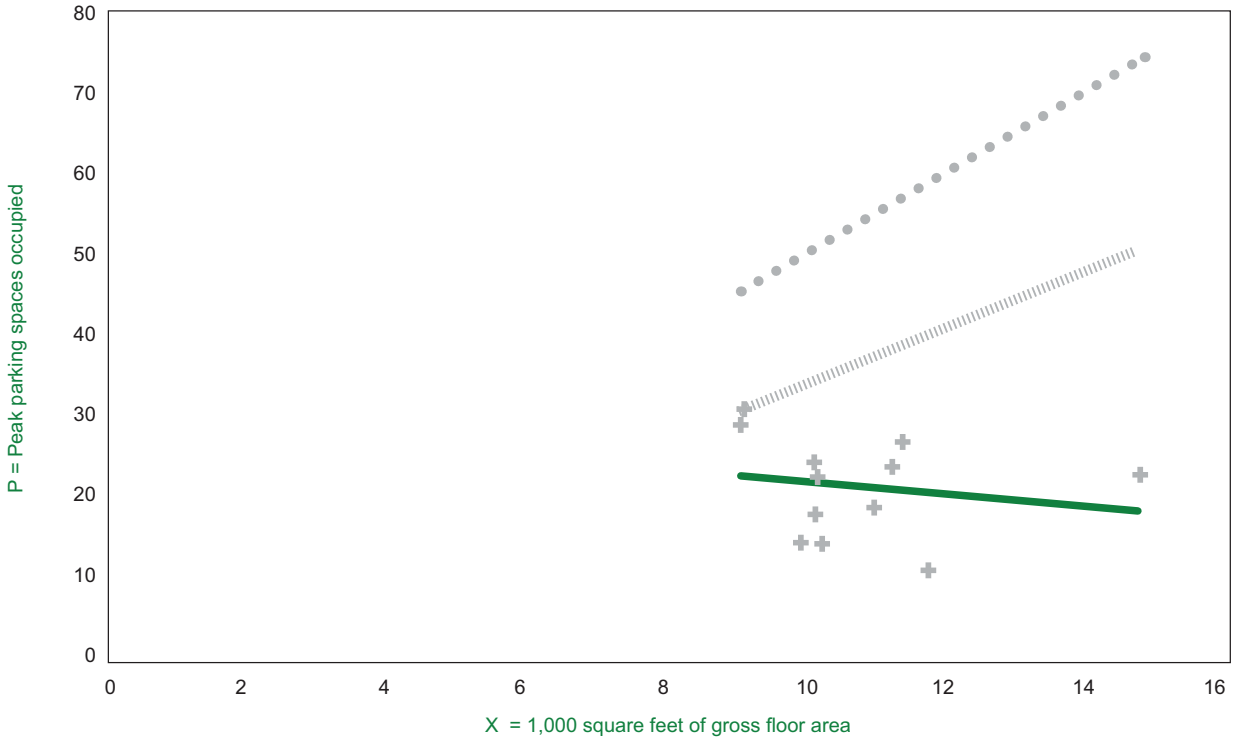
PHARMACIES WITH A DRIVE THRU

PEAK PARKING SPACES OCCUPIED VS: SQUARE FOOTAGE

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. SIZE OF PHARMACY
2.01 spaces per 1,000 sq. ft. of gross floor area	.94 - 3.40	2.38	.72	12	10,730
1 space per 497.1 sq. ft. of gross floor area	294.4 - 1,063.6	389.4	207.9		

DATA PLOT AND EQUATION



LEGEND			
Actual Data Points	Best Fitted Relationship	High Rate	Common Standard (1 Space per 200 Sq. Ft.)

FITTED LINEAR EQUATION: P=-0.758(X) + 29.706 R^2 = 0.04

V-22. SENIOR HOUSING, CONTINUING CARE RETIREMENT COMMUNITIES

LAND USE DESCRIPTION

Continuing Care Retirement Communities are age restricted complexes that include many housing forms, including detached and attached dwelling units, apartments, and residences, offering private and semiprivate rooms and a variety of levels of service to residents. The range of services provided include nursing home, adult day care, memory impaired, assisted living, and senior living. They offer social activities, congregate meals, supportive assistance, and personal care on one campus. Residents pay separately for housing, activities, meals, services and nursing care as needed or desired.

FACILITY INFORMATION

The four facilities surveyed accommodated between 192 and 720 residents at the time of the count. Facilities in this land use are located in freestanding buildings and ranged in size from 91,368 square feet to 556,795 square feet.

All four sites surveyed had public transit available within a quarter mile, which employees and visitors could utilize.

PARKING SURVEY INFORMATION

Of the four facilities examined, one was in an urban location, three were in a suburban location and no facilities were located in a rural location.

The continuing care retirement communities were surveyed in 2000 in Monroe County, New York. Parking observers made parking lot counts on weekday afternoons when the first and second shift employees were changing shifts. Analysis of facility questionnaires indicated that this land use typically required the highest number of parking spaces on a weekday during the first and second shift change time frame, due to the overlap in these two shifts. In all cases the peak parking demand occurred between 2:50 p.m. and 3:00 p.m.

FACILITY OBSERVATION

Comments from facility questionnaires for continuing care retirement community facilities revealed that three of the four described a shortage of parking as a problem. This shortage of parking was confirmed by parking observers for two of these facilities during the parking counts.

Two facilities described a shortage of parking which was confirmed in the field by parking counters. The lack of parking resulted in cars parking along the internal roadways, adjacent to buildings, parking in the fire lane and on the grass.

STATISTICAL ANALYSIS

The Data Plot and Equation chart shows peak observed occupied parking spaces relative to the number of residents at each continuing care retirement community. The chart includes the best fit linear relationship to the data as well as a line showing the high rate of parking demand. No common code standard was found among current parking regulations for continuing care retirement communities or elderly housing in Monroe County municipalities. Therefore, a common standard line is not geographically represented on the chart.

The best fit curve shown on the chart was derived through a regression analysis that included testing of 15 different functional forms and data transformations. Some of the non-linear relationships offered a slightly better fit to the data than did the simple linear relationship, but these other formulations are mathematical over fits to the few data points in the sample.

The linear form (P=a+bX) is more generalizable, and thus is the overall best fit of occupied parking spaces as a function of the number of residents. The coefficient of determination, R^2 = 0.96, confirms that the number of residents at a continuing care retirement community is, at least for this small sample, a strong predictor of the facility's peak occupied parking spaces.

The smallest facility in the sample has close to 200 residents, and, in fact, size is the primary factor that distinguishes retirement communities from continuing care facilities. For this reason, it is inappropriate to define average parking rates that could apply to the contradictory case of a retirement community with relatively few residents.

VARIABLES EXAMINED

The analysis sought did not examine any other variables that could also account for variation in demand.

CONCLUSIONS

The four facilities in the sample have peak parking space demands of 69 spaces plus from 0.28 to 0.52 spaces per resident. The small size of the sample suggests that policymakers might want to ensure adequate parking supply by using the high rate (or even raising this rate by 10 percent). Note, however, that at the two sites sampled with close to 700 residents, the high rate would lead to a parking supply that exceeded peak demand by more than 100 spaces.

Common Standard:	No common standard
Survey Result:	1 space per 2 residents

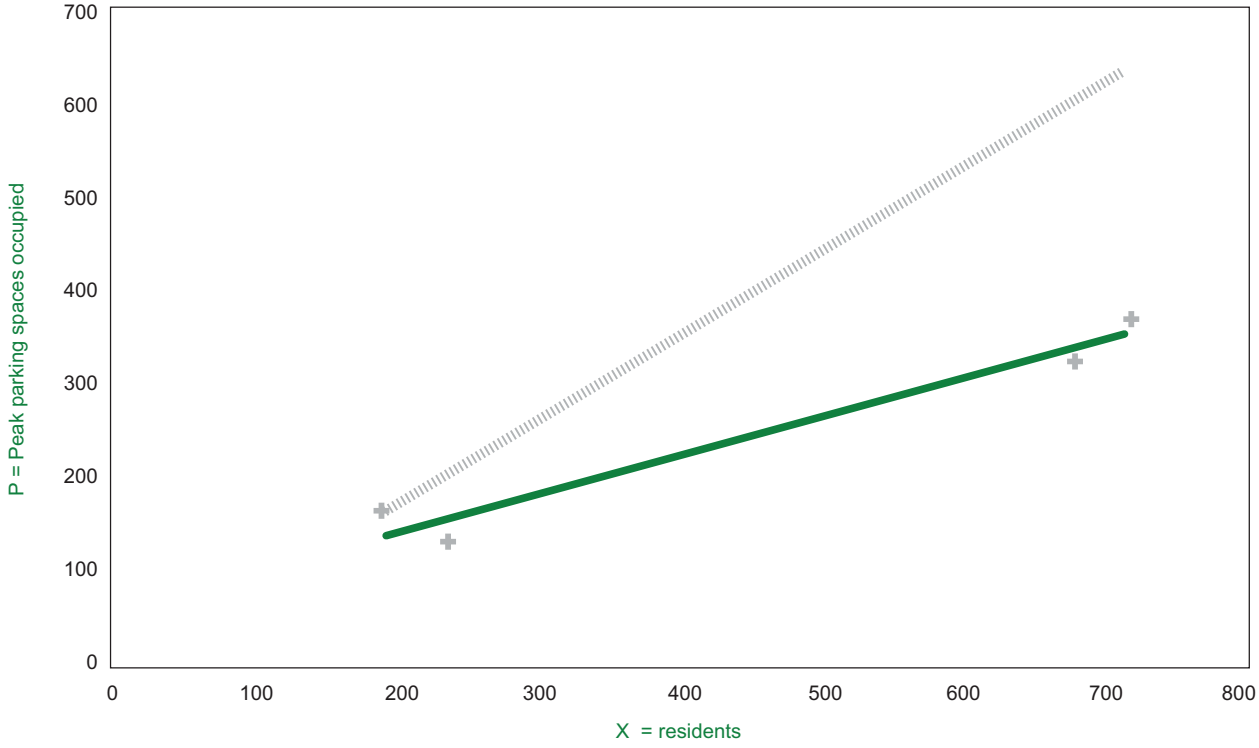
SENIOR HOUSING, CONTINUING CARE RETIREMENT COMMUNITIES

PEAK PARKING SPACES OCCUPIED VS: NUMBER OF RESIDENTS

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. NUMBER OF RESIDENTS
.55 spaces per 1 residents	.48 - .89	.77	.18	4	457
1 space per 1.82 residents	1.43 - 2.07	1.33	.42		

DATA PLOT AND EQUATION



LEGEND		
Actual Data Points	Best Fitted Relationship	High Rate

FITTED LINEAR EQUATION: P= 0.401(X) + 68.761 R^2 = 0.96

V-23. SENIOR HOUSING, NURSING HOMES

LAND USE DESCRIPTION

A nursing home is any facility whose primary function is to care for persons who are unable to care for themselves, for example rest homes (which are primarily for the aged), chronic care and convalescent homes. Traffic is primarily generated by employees, visitors and deliveries.

FACILITY INFORMATION

The ten facilities surveyed accommodated between 28 and 486 residents at the time of the count. Facilities in this land use are located in freestanding buildings and ranged in size from 12,486 square feet to 355,903 square feet.

Nine of the sites surveyed had public transit available within a quarter mile, which employees and visitors could use.

PARKING SURVEY INFORMATION

Of the ten facilities examined, four were located in an urban location, six were in a suburban location and no facilities surveyed were in a rural location.

The Nursing Homes were surveyed between the years of 2000 and 2003 in Monroe County, New York. Observations were conducted on weekday afternoons when the first and second shift employees were changing shifts. Analysis of facility questionnaires indicated that this land use typically required the highest number of parking spaces on a weekday during the first and second shift change timeframe, due to the overlap in these two shifts. In all cases the peak parking demand occurred between 2:30 p.m. and 6:00 p.m.

FACILITY OBSERVATION

Comments from facility questionnaires for nursing homes revealed that six of the ten sites described a shortage of parking as a problem. Three of the facilities that described a shortage of parking were confirmed in the field by parking counters. The lack of parking resulted in cars parking along the internal roadways, adjacent to buildings, parking in the fire lane and most often on the grass.

STATISTICAL ANALYSIS

The Data Plot and Equation chart shows the peak observed occupied parking spaces relative to the number of residents at each nursing home. The chart includes a best fit curve and a line representing the high rate found for the sample. There was no common standard found among current parking regulations for nursing homes in Monroe County. Therefore, a common standard line, which represents the local zoning requirements for nursing homes, is not graphically represented on the chart. Note that some municipalities in the county use a parking rate for the general category of nursing homes based on the number of beds and/or the number of employees.

The best fit curve shown on the chart was derived through a regression analysis that included testing of 15 different functional forms and data transformations. The simple linear relationship (P=a+bX) yields the best mathematical fit of occupied parking spaces as a function of the number of residents. The coefficient of determination, $R^2 = 0.85$, is close to 1.0 and, therefore, statistically demonstrates that the number of nursing home residents is a strong predictor of the facility's peak occupied parking spaces.

While the average number of peak occupied parking spaces for the sample is just over half a space (0.51) per resident, the sample includes a couple of facilities that deviate fairly widely from this rate. One facility used only 0.16 spaces per resident; another filled 1.36 parking spaces per resident in the peak (this is the high rate in the sample and is shown on the chart).

VARIABLES EXAMINED

This analysis did not consider any other variables that could also account for variation in demand.

CONCLUSIONS

The model shows a very good fit for peak occupied parking spaces based only on the number of residents in the facility. It suggests that 1 parking space for every 2 residents (or 0.5 parking spaces per resident) would be sufficient to meet the parking demands at most area nursing homes. There are, however, cases where the provision of this number of parking spaces would lead to spillover of excess parking demand. For this reason, policymakers might choose to adopt a higher standard. A rate of 1.5 residents per space would not be unreasonable. This is close to the 95 percent upper bound of the average rate of peak parking demand.

Common Standard:	No common standard
Survey Result:	1 space per 1.5 residents

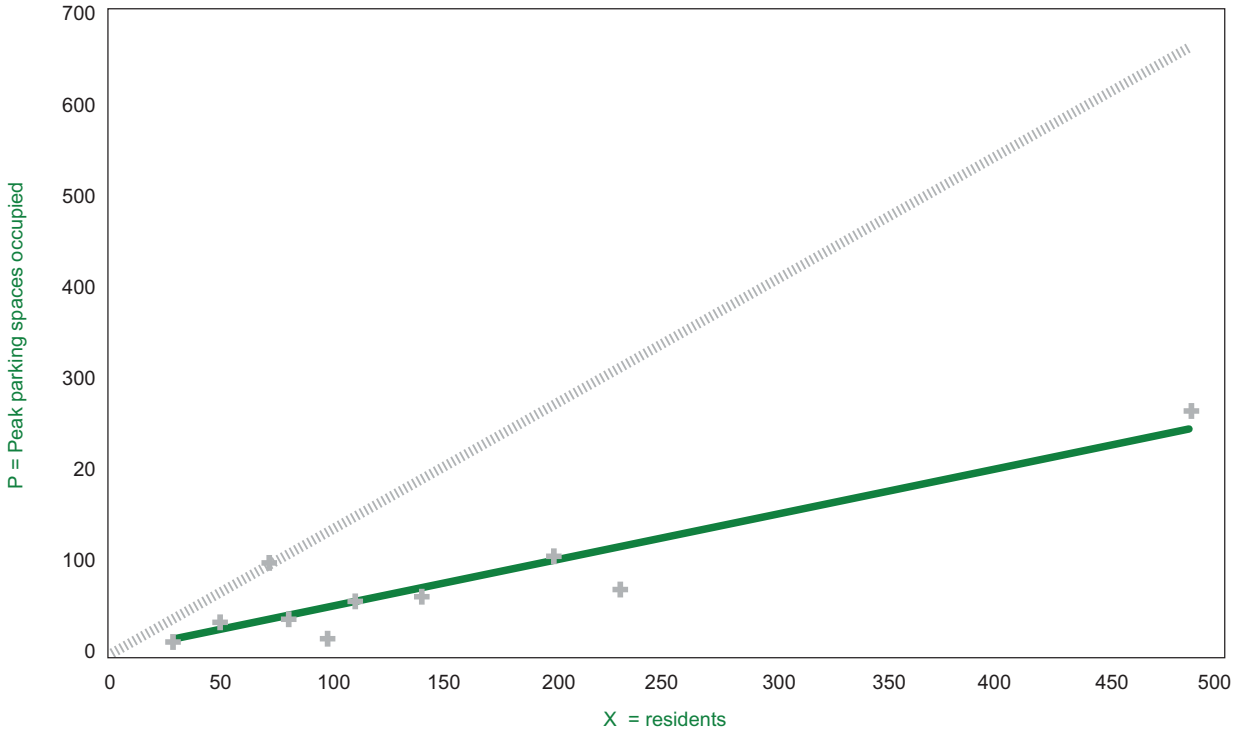
SENIOR HOUSING, NURSING HOMES

PEAK PARKING SPACES OCCUPIED VS: NUMBER OF RESIDENTS

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. NUMBER OF RESIDENTS
.51 spaces per 1 resident	.16 - 1.36	.69	.32	10	149
1 space per 1.97 residents	.73 - 6.13	1.13	1.45		

DATA PLOT AND EQUATION



LEGEND		
Actual Data Points	Best Fitted Relationship	High Rate

FITTED LINEAR EQUATION: P= 0.504(X) + 0.418 R^2 = 0.85

V-24. SENIOR HOUSING, SENIOR CITIZEN RESIDENTIAL COMMUNITIES

LAND USE DESCRIPTION

Senior Citizen Residential Communities include facilities which are included in the nursing homes, senior living and care facilities, and continuing care retirement communities land uses. These are facilities which provide residential units and which also may offer or provide services, supervision and care to senior citizens who may not be able to live independently; or in the case of a nursing home, persons who, by reason of chronic or long-term illness, regardless of age, may not be able to live independently. This study excludes senior housing developments and retirement communities which are based on age rather than need.

FACILITY INFORMATION

The 22 facilities surveyed accommodated between 28 and 720 residents at the time of the count. Facilities in this land use are located in freestanding buildings and ranged in size from 12,486 square feet to 556,795 square feet. According to site managers, the surveyed sites included a wide variety of services including nursing homes, adult day care, assisted living, retirement facility, memory impaired and senior living.

Twenty-one of the sites surveyed had public transit available within a quarter mile, which employees and visitors could use.

PARKING SURVEY INFORMATION

Of the 22 facilities examined, five were located in an urban location, 17 were in a suburban location and no facilities were in a rural location.

The senior citizen residential community facilities were surveyed between the years of 2000 and 2003 in Monroe County, New York. Observations were done on weekday afternoons when the first and second shift employees were changing shifts. Analysis of facility questionnaires indicated that this land use typically required the highest number of parking spaces on a weekday during the first and second shift change time frame, due to the overlap in these two shifts. In most cases, the peak parking demand occurred between 2:30 p.m. and 3:30 p.m.

FACILITY OBSERVATION

Comments from facility questionnaires for senior citizen residential community facilities revealed that nine of the twenty-two sites described a shortage of parking as a problem. Four of the facilities that described a shortage of parking were confirmed in the field by parking counters. The lack of parking resulted in cars parking along the internal roadways, adjacent to buildings, parking in the fire lane and on the grass. Facility managers also made comments pertaining to poor weather and the distance to the parking lot as being a major concern. One site included in the study had an underground parking garage. Parking observers also noted that parking spots are often taken up by a facility van or bus, delivery trucks and sales people.

STATISTICAL ANALYSIS

The Data Plot and Equation chart shows the peak observed occupied parking spaces relative to the number of residents in each senior citizen residential community. The chart shows the best fit curve and the high rate found for the sample. There was no common standard found among current parking regulations for nursing homes in Monroe County. Therefore, a common standard line, representing the local zoning requirements for senior citizen residential communities, is not shown on the chart. Note that some municipalities in the County use a parking rate for the general category of nursing homes based on the number of beds and/or the number of employees.

The best fit curve shown on the chart was derived through a regression analysis that included testing of different functional forms and data transformations. The simple linear relationship ($P=a+bX$) yields the best mathematical fit of occupied parking spaces as a function of the number of residents. The coefficient of determination, $R^2 = 0.91$, statistically established that the number of residents in these facilities is a strong predictor of their peak parking space demand.

The average number of peak occupied parking spaces for the sample is just over half a space (0.48) per resident. The sample includes a couple of facilities that deviate fairly widely from this rate. One facility used only 0.16 spaces per resident; another filled 1.36 parking spaces per resident in peak (this is the high rate in the sample and is shown in the chart).

VARIABLES EXAMINED

The analysis did not otherwise introduce new variables that could also account for variation in demand.

CONCLUSIONS

The model provides a very good fit for peak parking demand based on the number of residents in the facility. It suggests that 1 parking space for every 1.7 residents (or 0.6 parking spaces per resident) would be sufficient to meet the parking demands at most area nursing homes. This rate is approximately that of the 95 percent confidence interval upper bound of the average peak parking demand. Note that two of the observations in the sample have rates significantly above this level. In one case, the peak parking count was at the rate of 1 parking space for every 0.73 residents (or 1.36 spaces per resident). This rate is far beyond an appropriate standard for other facilities in this category. Further investigation may be warranted to understand the reasons for this apparent anomaly.

Common Standard:	No common standard
Survey Result:	1 space per 1.7 residents

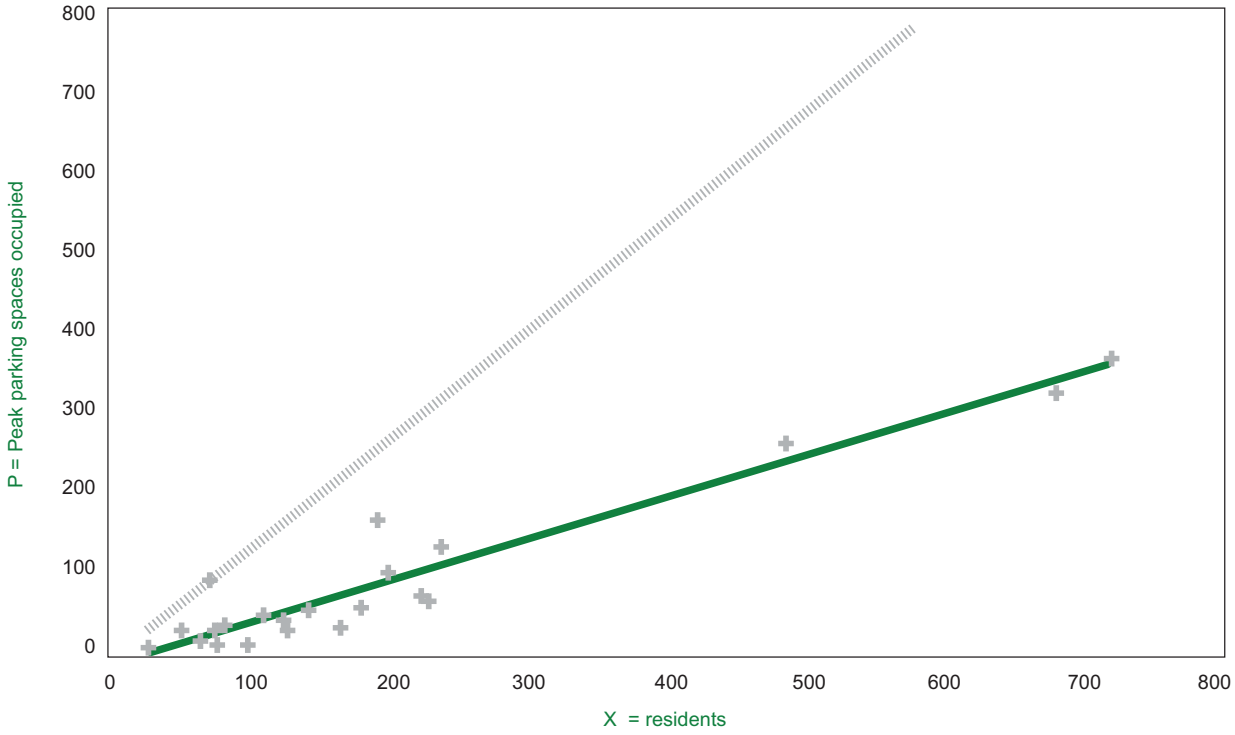
SENIOR HOUSING, SENIOR CITIZEN RESIDENTIAL COMMUNITIES

PEAK PARKING SPACES OCCUPIED VS: NUMBER OF RESIDENTS

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. NUMBER OF RESIDENTS
.48 spaces per 1 resident	.16 - 1.36	.57	.25	22	198
1 space per 2.08 residents	.73 - 6.13	1.63	1.23		

DATA PLOT AND EQUATION



LEGEND		
Actual Data Points	Best Fitted Relationship	High Rate

FITTED LINEAR EQUATION: P= 0.512(X) + -6.233 R^2 = 0.91

V-25. SENIOR HOUSING, SENIOR LIVING AND CARE FACILITIES

LAND USE DESCRIPTION

Senior Living and Care facilities may offer supportative services, personalized assistance, and supervision for senior citizens who may need help with activities of daily living however, do not require intensive health care as provided by a nursing home. These facilities have a central or private kitchen, dining, recreational and other facilities with separate bedrooms or living quarters where the emphasis of the facility remains residential.

FACILITY INFORMATION

The seven facilities surveyed accommodated between 65 and 223 residents at the time of the count. All of these facilities were located in freestanding buildings and ranged in size from 38,862 square feet to 200,000 square feet. According to site managers, the surveyed sites included either assisted living, adult day care or retirement facility services.

All seven of the sites surveyed had public transit available within a quarter mile, which employees, residents or visitors could use.

PARKING SURVEY INFORMATION

All seven of the facilities examined were located in a suburban location. No sites were examined in an urban or rural location.

The senior living and care facilities were surveyed between the years of 2000 and 2003 in Monroe County, New York. Observers made parking lot counts on weekday afternoons when first and second shift employees were changing shifts. Analysis of facility questionnaires indicated that this land use typically required the highest number of parking spaces on a weekday during the first and second shift change time frame, due to the overlap in these two shifts. In all cases the peak parking demand occurred between 2:30 p.m. and 3:30 p.m.

FACILITY OBSERVATION

Comments from facility questionnaires for senior living and care facilities revealed that one of the seven sites described a shortage of parking as a problem. The lack of parking was a concern for those living in independent apartments. A higher percentage of residents have cars for this land use, and many have regular visitors. Facility managers also made comments pertaining to poor weather and the distance residents or elderly visitors would have to walk from the parking lot to the buildings as being a major concern.

Parking observers also noted that parking spots are often taken up by a facility van or bus, delivery trucks or maintenance trucks.

STATISTICAL ANALYSIS

The Data Plot and Equation chart shows the peak observed occupied parking spaces relative to the number of residents at each senior living and care facility. The chart includes a best fit, and the high rate, each of which is described below. There was no common standard found among current parking regulations for senior living and care facilities in Monroe County. Therefore, a common code standard line, which represents the local zoning requirements for the facility type is not graphically represented on the chart. Note that some municipalities in the County use a parking rate for the general category of nursing homes based on the number of beds and/or the number of employees.

The best fit curve shown on the chart was derived through a regression analysis that included testing of functional forms and data transformation. The simple linear relationship (P=a+bX) yields the best mathematical fit of occupied parking spaces as a function of the number of residents. The coefficient of determination, R^2 = 0.88, is close to 1.0 and, therefore, statistically demonstrates that the number of residents at a senior living and care facility tends to be a strong predictor of the facility's peak occupied parking spaces.

The average number of peak occupied parking spaces for the sample is less than one-third of a space (0.31) per resident (or one space for every 3.21 residents). This rate is much lower than that for nursing homes, reflecting the lower number of staff at these senior living and care facilities. The range of rates is also fairly narrow (0.21 to 0.37 peak occupied spaces per resident). The high rate of 0.37 spaces per resident is also included on the chart.

VARIABLES EXAMINED

The analysis did not otherwise introduce new variables into the equations that could also account for variation in demand.

CONCLUSIONS

The analysis shows a very good fit for peak occupied parking spaces as a function of the number of residents in the facility. It suggests that municipalities seeking to ensure adequate on-site parking for senior living and care facilities should require at least 1 space for every 2.7 residents. This is close to the 95 percent upper bound of the average rate of peak parking demand. Compared with this rate, the highest rate found for the sample, 1 space for every 2.3 residents, would only add an additional eight parking spots for the average sized facility (43 residents). This may be a worthwhile trade-off for the extra assurance that a new senior living and care facility could meet its parking demand.

Common Standard:	No common standard
Survey Result:	1 space per 2.3 residents

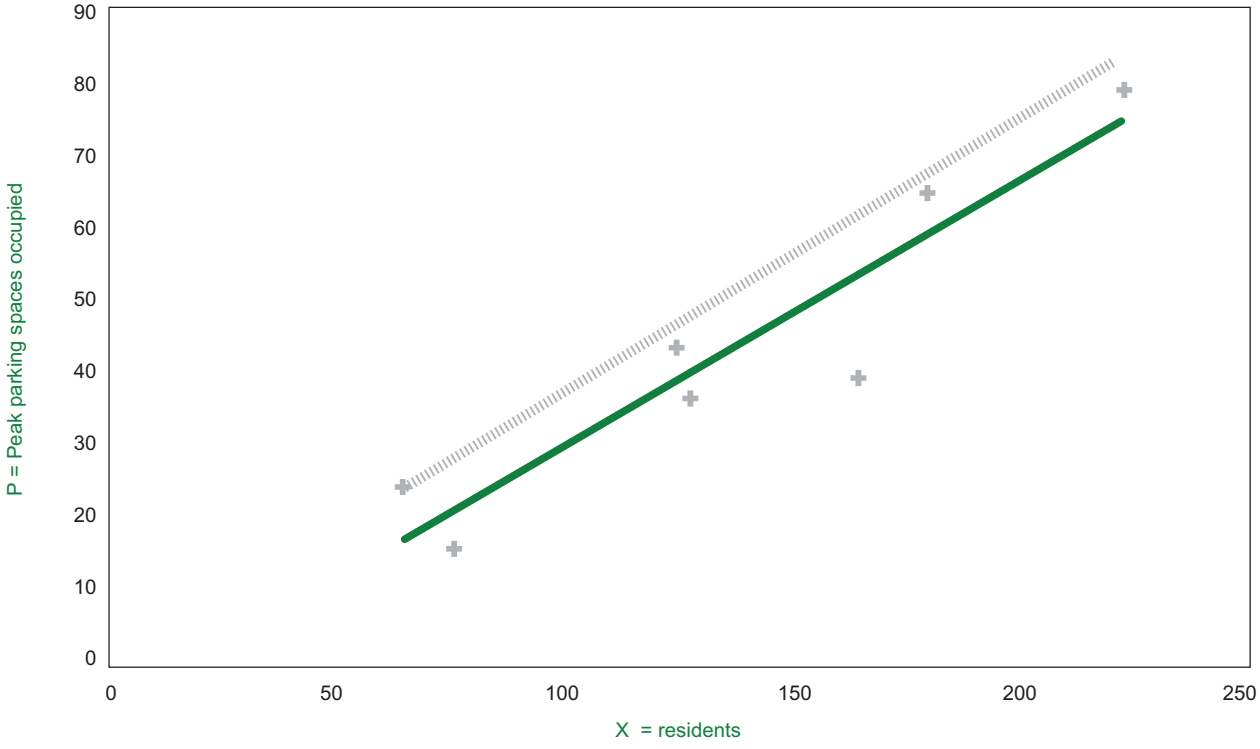
SENIOR HOUSING, SENIOR LIVING AND CARE FACILITIES

PEAK PARKING SPACES OCCUPIED VS: NUMBER OF RESIDENTS

PARKING GENERATION RATES

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. NUMBER OF RESIDENTS
.31 spaces per 1 resident	.21 - .37	.36	.06	7	137
1 space per 3.21 residents	2.71 - 4.75	2.61	.81		

DATA PLOT AND EQUATION



LEGEND		
Actual Data Points	Best Fitted Relationship	High Rate

FITTED LINEAR EQUATION: P= 0.359(X) - 6.493 R^2 = 0.88

V-26. SHOPPING CENTERS

LAND USE DESCRIPTION

Shopping centers are a group of commercial businesses offering a range of retail goods and services with an aggregate gross floor area greater than 25,000 square feet that is designed as a single commercial group, whether or not located on the same lot. The group is under common ownership or management, or has a common arrangement for the maintenance of the grounds. There is generally a shared parking area, and a single name for the complex.

FACILITY INFORMATION

The 15 facilities surveyed ranged in size from 26,622 square feet to 291,865 square feet. The following list represents the most common types of businesses found in shopping centers included in this analysis, which are listed in decreasing order of frequency: Fast food restaurant, big box anchor, bank, restaurant, clothing/footwear, electronics, barber/salon, martial arts studio, dollar discount, liquor, tailor/shoe repair, supermarket, coffee shop, pharmacy, furniture, and tax related service.

Fourteen sites surveyed had public transit available within a quarter mile, which employees and customers could use.

PARKING SURVEY INFORMATION

Of the 15 facilities examined, no sites were in an urban location, 13 were in a suburban location and two were in a rural location.

The shopping centers were surveyed between the years of 2003 and 2004 in Monroe County, New York. In most cases the peak parking demand occurred between 11:15 a.m. and 4:00 p.m. Observations were made based on the hours reported on the facility questionnaires as the busiest time of the week by facility managers, including holidays.

FACILITY OBSERVATION

Comments on facility questionnaires revealed that facility managers and/or owners are concerned about the traffic flow through the site and have tenants that would like designated parking spaces in front of their stores for their customers.

Parking observers noted that cars drove very fast through one site and that another site had a very congested entrance which was difficult to navigate. One facility had striped cross walks in front of the larger stores.

STATISTICAL ANALYSIS

The Data Plot and Equation chart and table shows the relationship between observed peak occupied parking spaces and the shopping center's square footage during non-holiday periods. The best fit curve for the data is a simple linear relationship of 11 spaces plus 2.21 spaces per every 1,000 square feet. This is a strong, positive relationship with a goodness of fit measure (R^2) of 0.80. A perfect predictor would have an R^2 value of 1.0.

VARIABLES EXAMINED

The variables examined included tests of different functional specifications of square footage. None offered an improved fit beyond that of the linear relationship. Both holiday and non-holiday counts were taken, however, only non holiday counts were used in the analysis. The analysis also examined differences between weekday and weekend counts.

CONCLUSIONS

A rate of 1 space per 200 square feet is a reasonable minimum parking standard for shopping centers. This is a current common standard used for retail land uses, and it fits with the sample. The observed parking demands fall below this rate, and only in one case, on a holiday period, did one of the shopping centers exceed this level, with an observed rate of 1 space per 195 square feet.

Five of the 15 shopping centers in the sample had parking counts on both holiday and non-holiday periods, although only non-holiday counts were used in the analysis. In four cases, the holiday parking demand was 13 to 50 percent higher than on the non-holiday period at the same facility. The observed holiday parking demand at the fifth shopping center, however, was only 52 percent of that observed on a non-holiday period. The reason for this distinction could not be determined.

Plentiful free parking is a standard feature of shopping centers in non-urbanized settings, and indeed the largest shopping centers can call for shoppers to walk up to a quarter mile or more from the edge of the parking lot to the nearest entrance. Each of the shopping centers observed had a parking supply (the number of total spaces) above even the holiday parking demand and far above the prevailing local parking standards.

Common Standard:	1 space per 200 sq. ft.
Survey Result:	1 space per 200 sq. ft.

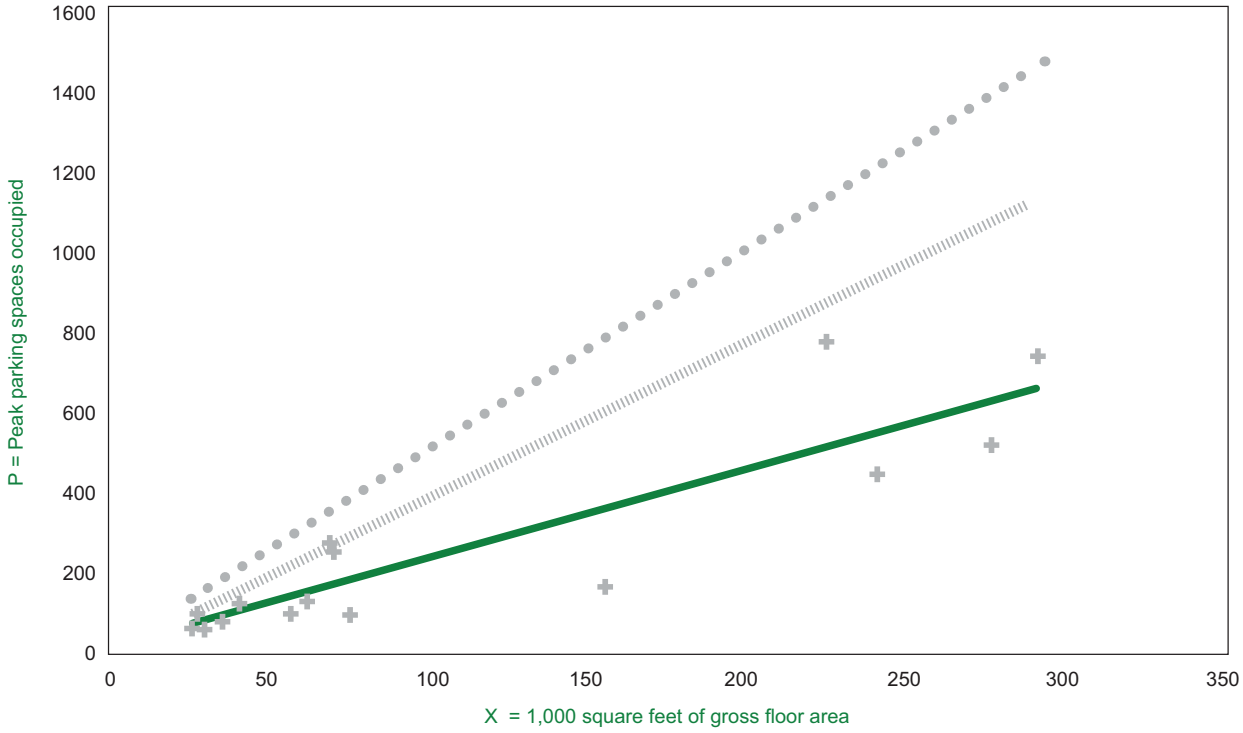
SHOPPING CENTERS

PEAK PARKING SPACES OCCUPIED VS: SQUARE FOOTAGE

PARKING GENERATION RATES – NON HOLIDAYS

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. SQUARE FEET GFA
2.31 spaces per 1,000 sq. ft. of gross floor area	1.03 - 3.87	2.70	.85	15	112,278
1 space per 437.7 sq. ft. of gross floor area	258.4 - 973.1	341.6	200.4		

DATA PLOT AND EQUATION



LEGEND			
Actual Data Points	Best Fitted Relationship	High Rate	Common Standard (1 Space per 200 Sq. Ft.)

FITTED LINEAR EQUATION: P= 2.211(X) + 11.16 R^2 = 0.80

V-27. SUPERMARKETS

LAND USE DESCRIPTION

Supermarkets are retail establishments primarily selling food, as well as other convenience and household merchandise. The majority of the floor area is devoted to perishable and non-perishable food items for preparation and consumption off premises. The majority of the sites included in the survey had at least one other non food related section within the store such as cards, flowers, seasonal merchandise, pharmacy and food for consumption on site.

FACILITY INFORMATION[7]

The 18 facilities surveyed ranged in size from 12,000 square feet to 101,144 square feet. Fifteen of the facilities were located in shopping centers and three facilities were freestanding buildings.

Sixteen sites surveyed had public transit available within a quarter mile, which employees or customers could use.

PARKING SURVEY INFORMATION

Of the 18 facilities examined, two were in an urban location, 14 were in a suburban location and two were in a rural location.

Supermarket facilities were surveyed between the years of 2002 and 2004 in Monroe County, New York. In all cases the peak parking demand occurred between 11:15 a.m. and 6:00 p.m. Thirteen peak counts were observed on weekdays and five were observed on weekends. Weekday peaks generally occurred between 2:00 p.m. and 6:00 p.m. Weekend peaks generally occurred between 11:30 a.m. and 12:30 p.m. Observations were made based on the hours reported on the facility questionnaires as the busiest time of the week by facility managers. Holiday counts were not included.

[7] Please note, not all supermarket chains within the Monroe County area were analyzed.

FACILITY OBSERVATION

Comments from facility questionnaires for supermarkets revealed that three of eighteen sites described a shortage of parking spaces as a problem. One manager specifically cited that there were not enough handicap spaces while another stated that the parking shortage only occurred during holidays and special sales events. Comments from other managers included problems with cars that are frequently deserted and go unclaimed, parking spaces and aisles that are too small, a parking lot that needs to be paved and re-striped, and that parking in the fire lane in front of the store was a frequent problem.

Parking observers did not comment on a shortage of parking spaces, but rather that only a third of one lot for one site was used. Most comments from the observers were in regards to site design and safety concerns regarding pedestrians and cars cutting through aisles. In one parking lot count, the observer noted that due to the snow on the pavement, the striped parking spaces were difficult to see.

STATISTICAL ANALYSIS

The Data Plot and Equation chart shows the peak observed occupied parking spaces relative to the gross square footage of each supermarket observed during a non-holiday period. The chart includes a best fit curve, high rate, a 95 percent confidence rate, and the common standard found among current parking regulations for supermarkets in Monroe County.

There is no distinguishing between weekdays and weekends, as there was no pattern discernible among the six supermarkets that had counts on both weekdays and weekend periods. On average, the peak parking counts on the weekends were 8 percent higher than those on the weekdays.

The charts include a line showing a 1 space per 200 square foot standard. This is the most common standard found among current parking regulations for supermarkets in Monroe County. The common standard is close to the high rate observed for the sample (1 space per 211 square feet), which is also shown on the chart. Note that the high rate applies to the smallest of the 18 observed supermarkets. Most of the peak parking counts for the other markets fall well below this rate, and this is reflected in the decreasing slope of the exponential best fit line.

The chart also shows the best fit relationship for peak occupied spaces as a function of square footage of the facilities. Square footage is a satisfactory measure as evident by the goodness of fit measurement (R^2) of 0.59. A measurement of 1.0 would indicate a perfect linear relationship between square footage and supermarket's peak parking demand.

VARIABLES EXAMINED

The variables considered for testing included the location of the supermarket (e.g., freestanding or part of a plaza), and the effect of a holiday on parking demand. Only three of the counts were not located in a plaza, and this was an insufficient sample on which to base statistical inferences.

CONCLUSIONS

The increasing size of supermarkets does not reflect a commensurate increase in peak parking demand. The observations suggest that the rate of peak parking demand tends to flatten out with increasing gross floor area. Thus, a parking rate of 1 space per 200 square feet may be reasonable for supermarkets in the 20,000 square foot range, but excessive for supermarkets with 100,000 square feet. The one supermarket in the sample near this latter size had a peak parking demand of only 180 spaces which is a parking rate of 1 space per 562 square feet. Based on these observations, a reasonable standard would account for the non-linear relationship between supermarket size and peak parking demand.

Counts at four supermarkets occurred on holiday and non-holiday periods, although the holiday counts were not used in the analysis. On average, the holiday period increased the peak parking demand by 31 percent. At one supermarket, the observed holiday peak parking demand was 80 percent above that observed on a non-holiday period.

Common Standard:	1 space per 200 sq. ft.
Survey Result:	
SUPERMARKET SIZE	MINIMUM PARKING SPACES
<30,000 square feet	1 space per 200 square feet
30,000 to 60,000 square feet	150 spaces plus 1 space per 300 square feet over 30,000 square feet
60,000 to 90,000 square feet	250 spaces plus 1 space per 400 square feet over 60,000 square feet
>90,000 square feet	325 spaces plus 1 space per 500 square feet over 90,000 square feet

These rates should still allow sufficient parking spaces for holiday shopping loads.

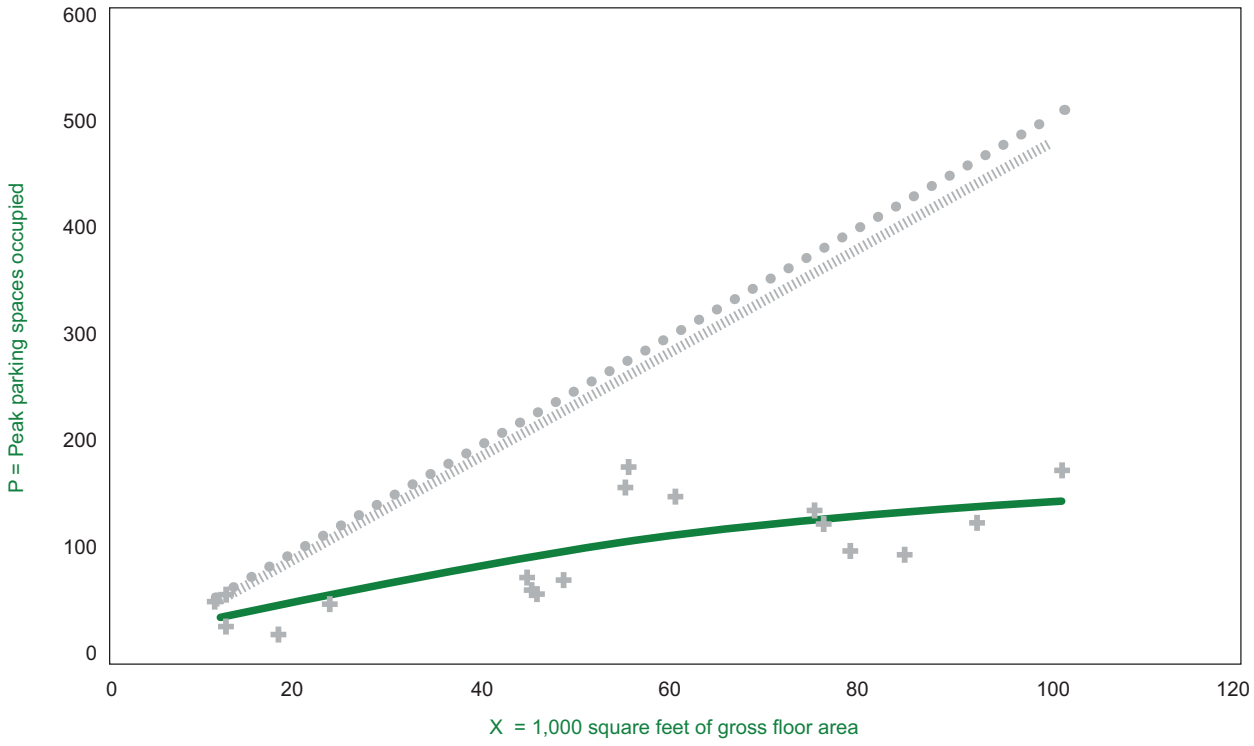
SUPERMARKETS

PEAK PARKING SPACES OCCUPIED VS: 1,000 SQUARE FEET OF GROSS FLOOR AREA

PARKING GENERATION RATES - NON HOLIDAYS

AVERAGE RATE	RANGE OF RATES	UPPER BOUND RATE (95% C.I.)	STANDARD DEVIATION	NUMBER OF OBSERVATIONS	AVG. SQUARE FEET GFA
1.902 spaces per 1,000 sq. ft. of gross floor area	1.17 - 4.75	2.34	1.06	18	52,320
1 space per 526 sq. ft. of gross floor area	211 - 855	448	188		

DATA PLOT AND EQUATION



LEGEND			
Actual Data Points	Best Fitted Relationship	High Rate	Common Standard (1 Space per 200 Sq. Ft.)

FITTED CURVE EQUATION: P= 2.239(X) - 0.00886(X2) + 13.338 R^2 = 0.59

APPENDIX A. SUMMARY OF DATA BY LAND USE

Land Use	Year(s) Facilities were Observed	Number of Sites Contacted	Number of Observations Collected	Number of Facility Questionnaires Received	Number of Facilities Included in Analysis
Banking Facilities with a Drive Thru	2003	150	23	15	11
Church/Synagogues	2003-2004	133	40	46	24
Convenience Stores	2002-2004	107	36	38	Without Gas = 11 with Gas = 17
Day Care	2001-2003	64	33	42	19
Donut, Coffee, Bagel Shops	2003-2004	51	20	15	With Drive Thru = 5 Without Drive Thru = 9
Family Restaurant	2003-2004	137	47	40	Menu = 14 Menu Board = 10
Fast Food Restaurants with a Drive Thru	2003	90	19	17	15
Fitness Centers	2003-2004	72	31	27	Adult = 12 Community = 9
Funeral Homes	2002-2004	55	14	12	6
Home Improvement Stores	2002-2003	15	19	9	9
Hotels	2003-2004	44	52	25	19
Industrial Facilities	2001-2003	82	36	36	34
Marine Facilities	2002-2004	57	29	24	15

Land Use	Years Facilities were Observed	Number of Sites Contacted	Number of Observations Collected	Number of Facility Questionnaires Received	Number of Facilities Included in Analysis
Office, Medical/Dental	2001-2003	58	30	26	16
Office Buildings	2003	86	52	52	General = 42 Park = 8
Pharmacies with a Drive Thru	1999-2002	15	25	15	12
Senior Housing	2000-2003	26	26	27	Continuing Care = 4 Nursing Homes = 10 Senior Citizen = 22 Senior Living = 7
Shopping Centers	2003-2004	44	38	17[8]	15
Supermarkets	2003-2004	44	33	22	18

[8] One development company which owns and manages many shopping centers within this region granted permission to observe any of their sites. Therefore questionnaires were not collect for these sites. The information needed on these sites was collected from the Monroe County Real Property data and site visits.

APPENDIX B. SAMPLE LETTER TO FACILITY MANAGERS

Department of **Planning and Development**

Monroe County, New York

Maggie Brooks
County Executive

Judy A. Seil
Acting Director

<<Insert Date>>

<<Insert Facility>>
<<Insert Address>>
<<Insert City, State Zip>>

Dear Facility Manager:

The Monroe County Department of Planning and Development has established a Parking Survey Advisory Committee to obtain accurate parking counts for various land-uses for future development within Monroe County. The advisory committee has developed a process to conduct parking counts for various land-uses and would like to obtain permission to conduct a parking survey at your facility.

This survey will aid interested municipalities within Monroe County in the evaluation of their current parking standards for future development and provide current parking data for developers and consultants. Once all of the various parking counts are conducted and compiled for churches/synagogues, we will share this information with participating places of worship, municipalities within Monroe County and all other interested parties.

The parking count on your site would require access for two Monroe County employees at your site for approximately two to four hours for approximately one to two days. The employees would count the number of vehicles parked during specified time periods based on the typical weekly parking peaks. The data collected from participating churches/synagogues surveyed within Monroe County will be analyzed to determine an accurate parking ratio for future development.

We hope you will join us in this effort to provide information to assist in the evaluation of current parking standards used by local governments within Monroe County. It would be greatly appreciated if you would fill out the attached parking occupancy survey form for churches/synagogues, which contains specific questions about your facility. We are planning to begin conducting parking surveys in the next couple of months and would appreciate your response to the parking occupancy survey form by <<insert date>>.

We will be following up on this letter to determine if you are interested in participating in this survey. Thank you for your time and consideration of this project. If you have any questions, I can be contacted at <<insert number>>.

Sincerely,

<<Insert signature>>

Attachment

APPENDIX C. SAMPLE FACILITY QUESTIONNAIRE FORM

Each land use has a separate facility questionnaire form. All land use questionnaires can be found on Monroe County's website: www.monroecounty.gov. Below is a sample of the Church/Synagogues Land Use.

FACILITY QUESTIONNAIRE FORM - CHURCH/SYNAGOGUES

Name: _____
Site address: _____
Site location (City/Town): _____

1. What is the square footage of the entire building? _____

2. Are there any other uses occupying your building? ❑ Yes ❑ No

3. Does the facility share parking with another use? ❑ Yes ❑ No

4. Do you have designated parking? ❑ Yes ❑ No
   If yes, how many parking spaces? _____

5. How many parking spaces are on site? Standard spaces: _____ Handicap spaces: _____

6. What are the days and hours that your facility is in operation? _____

7. Please indicate the busiest time ranges below?

Day of Week	AM	PM
Monday	-	-
Tuesday	-	-
Wednesday	-	-
Thursday	-	-
Friday	-	-
Saturday	-	-
Sunday	-	-

8. Please check all the services that your facility provides and document the number of designated parking spaces for each service if applicable.

Banquet Rm/ Meeting Rm	Sq. ft.	Community Center	Sq. ft.	School	Sq. ft.
Bible Study	Sq. ft.	Day Care	Sq. ft.	Sunday School	Sq. ft.
Clubs	Sq. ft.	Plays	Sq. ft.	Other	Sq. ft.

9. Please indicate the number of : Members _____ Employees _____

10. What is the worship seating capacity for your facility? _____

11. Do you have a site plan that shows the parking spaces on it? ❑ Yes ❑ No

12. What are your biggest parking concerns and or problems? _____

_____

13. Based on our intent to gather information on parking, do you have any information you feel we should know about? ❑ Yes ❑ No

_____

_____

❑ Yes, permission granted to come out to the site and conduct a parking survey.

❑ Please contact the following person for permission to come out to the site to conduct a parking survey

Name: _____ Title: _____

Phone No.: _____ Email: _____

Completed by: _____ Date: _____

Phone No.: _____

Please fax or mail to:

Monroe County Department of Planning and Development

50 West Main Street, Suite 8100

Rochester, New York 14614

Telephone: 585-753-2000/Fax: 585-753-2028/Email: <*insert*>@ monroecounty.gov

If you have any questions, please feel free to call us.

Thank you for your time and assistance with this project.

APPENDIX D. SAMPLE FIELD SURVEY OBSERVATION FORM

Land use to be surveyed _____
Name of counter _____
Phone number _____
Name of Facility _____
Address of Facility _____
Municipality _____

Count Done - Day:_____
Count Done - Time of Day:_____

PARKING

Hour beginning									
Regular Spaces									
Handicap Spaces									
Not in a Space									
Other									
Other Explain									
Total Spaces									

Hour beginning									
Regular Spaces									
Handicap Spaces									
Not in a Space									
Other									
Total Spaces									

Drive Thru

Hour beginning									
Drive thru #1									
Drive thru #2									
Total for time interval									
Largest amount of stacked cars during interval									

Hour beginning									
Drive thru #1									
Drive thru #2									
Total for time interval									
Largest amount of stacked cars during interval									

1. Day of the week and date of survey including year: _____
2. Weather conditions _____
3. Peak number of vehicles parked: _____
   Peak number of vehicles in drive thru: _____
4. Number of parking space on site? Standard Spaces _____ Handicap spaces _____
5. Did any cars park in the fire lane or in a no parking zone? _____
6. Was the traffic pattern confusing? _____
7. Were there any accidents at the entrance or internal to the site? _____
8. How did pedestrians use the site? _____
9. Was there a drive through on the site? _____
   If so, how many? _____
10. Is public transit available within 3 blocks of the site? _____
11. Car Dealerships: how much inventory is carried on the site for the day? _____
12. **S**ite environment: Urban, Sub, Rural _____
13. On average, how long did the customer wait to be served? (Time how long it takes vehicles entering and exiting the drive thru) _____
14. Restaurant: Does the facility serve alcohol? _____
    If so, does it have a bar? _____
15. Number businesses located at the facility? _____
    Please list: _____
16. Number buildings on site: _____
17. Is the site located in a plaza? _____
18. Other comments:

_____

APPENDIX E. SUMMARY OF OBSERVATION TABULATIONS PER LAND USE

Land Use	Tabulation
Banking Facilities with a Drive Thru	15 minute intervals for at least 2 ½ hours at each facility during peak hours Monday thru Saturday
Church/Synagogues	1 observation 15 minutes after the start of weekly worship service for each worship service
Convenience Stores	15 minute intervals for at least two hours at each facility during peak weekday hours
Convenience Stores with Gas Stations	15 minute intervals for at least 1 ½ hours at each facility during peak weekday hours
Day Cares	15 minute or 30 minute intervals for at least 1 ½ hours at each facility during peak weekly drop-off and pick up hours
Donut Coffee Bagel Shops with a Drive Thru	15 minute intervals for at least 3 hours at each facility during peak weekday and weekend mornings
Donut Coffee Bagel Shops without a Drive Thru	15 minute intervals for at least 2 hours at each facility during peak weekday and weekend mornings
Family Restaurants, Menu	30 minute or 60 minute intervals for at least 3 hours during peak weekday and weekend hours
Family Restaurants, Menu Board	30 minute or 60 minute intervals for at least 2 ½ hours during its reported period of weekly peak activity, typically on Friday during lunch, Friday evenings and Saturday evenings
Fast Food Restaurants with a Drive Thru	15 minute intervals for at least 2 hours during peak weekday and weekend hours
Fitness Centers, Adult	30 minute intervals for at least 2 ½ hours during peak weekday hours
Fitness Centers, Community	30 minute intervals for at least 2 ½ hours at each facility during peak morning and evening hours
Funeral Homes	15 minute intervals during funeral gatherings on weekday evenings
Home Improvement Stores	30 minute to 60 minute intervals for at least 2 ½ hours at each facility during peak weekday and weekend hours
Hotels	60 minute intervals for at least 2 hours at each facility during peak weekday and weekend hours
Industrial Facilities	30 minute or 60 minute intervals for at least 1 hour on weekdays afternoons when the first and second shift employees were changing shifts
Marine Facilities	30 minute or 60 minute intervals for at least 3 hours at each facility on sunny or mostly sunny days during peak summer months on weekdays and weekends
Office Buildings, General	60 minute to 90 minute intervals for at least 1 hour at each facility during peak weekday hours

Land Use	Tabulation
Office Parks	60 minute intervals for at least 1 hour at each facility during peak weekday hours
Land Use	Tabulation
Pharmacies with a Drive Thru	15 minute intervals for at least 1 ½ hours during weekday evenings and weekend mornings
Senior Housing, Continuing Care Retirement Communities	60 minute intervals for at least 2 hours during weekday afternoons when the first and second shift employees were changing shifts
Senior Housing, Nursing Homes	30 minute or 60 minute intervals for at least 2 hours during weekday afternoons when the first and second shift employees were changing shifts
Senior Housing, Senior Citizen Residential Communities	30 minute or 60 minute intervals for at least 2 hours during weekday afternoons when the first and second shift employees were changing shifts
Senior Housing, Senior Living and Care Facilities	30 minute or 60 minute intervals for at least 2 hours during weekday afternoons when the first and second shift employees were changing shifts
Shopping Centers	30 minute to 60 minute intervals for at least 3 hours at each facility during peak weekday and weekend hours
Supermarkets	30 minute to 60 minute intervals for at least 2 hours at each facility during peak weekday and weekend hours

APPENDIX F. GLOSSARY OF TERMS

Actual Data Point: Each data point represents one observed site's dependent variable (peak parking spaces occupied) per unit of independent variable (square footage, number of seats, number of residents, etc.)

Average: The average of a list of numbers equals their sum, divided by the number of observations.

Average Rate: Parking generation rate that is the average number of occupied parking spaces per one unit of the independent variable (ex: square footage).

Best Fit Line: See "Best Fitted Linear Relationship".

Best Fitted Relationship: The best fit regression equation, expresses the optimal mathematical relationship between two or more related variables. If the variables are related linearly, the equation will be in the following format: P=a+bX. In a nonlinear relationship, the equation will have a different format, usually Ln(P)=aLn(X)+b.

Coefficient of Determinations: A measurement of the goodness of fit of the relationship between a dependent and independent variable in a regression analysis represented by R^2. As the strength of the relationship between variables increases, so does the correlation coefficient. A perfect fit is represented by a R^2 of 1.0.

Common Standard: Most commonly used parking requirement within Monroe County for a land use as defined by each municipality's land use and zoning codes.

Confidence Interval (C.I.): Based on a given probability estimates a specific variable will occur within a certain range of values.

Data Plot and Equation: The diagram that displays data points of a dependent variable and an independent variable. Some land uses have two charts because more than one independent variable was considered.

Dependent Variable: The variable that changes in response to changes of an independent, explanatory variable. (See "Independent Variable".)

Fitted Curve Equation: Equation used to determine the best fitted relationship. A curve does not represent a linear relationship. See "Best Fitted Relationship"

Fitted Linear Equation: Equation used to determine the best fitted relationship. A linear equation is represented by a straight line. See "Best Fitted Relationship"

Freestanding Building: A freestanding building is a building that is not attached to another building. Buildings that are built on a separate parcel but within a defined area such as an out parcel within a shopping center were considered to be a stand alone building.

Gross Leasable Area (GLA): Total floor area designated for tenant occupancy. This includes the square footage of basements, mezzanines and upper floors that are occupied for tenant use.

Gross Floor Area (GFA): The sum of a building in square feet including the square footage of the basement, mezzanines, penthouses, corridors, lobbies, stores and office area of each floor level.

High Rate: The rate of the highest observed site within a particular land use analysis.

Independent Variable: The independent variable is an explanatory variable that is assumed to have some effect on the dependent variable. This study has generally sought to test the hypothesis that peak parking demand (the dependent variable) is a function of facility square footage (an independent variable).

Institute of Transportation Engineers (ITE): The Institute of Transportation Engineers is an international educational and scientific association of transportation professionals. ITE members include traffic engineers, transportation planners and other professionals that are responsible for planning, designing, implementing, operating and maintaining safe and efficient transportation systems. ITE was founded in 1930. See www.ite.org for more information.

Linear Relationship: When two variables are perfectly linearly related, the data points of a scatter plot graph fall on a straight line (as opposed to a curve). In a perfect linear relationship, the data points fall on a straight line. This condition typically suggests a statistically strong explanatory relationship. An exception, for example, would be for a land use where all facilities had 10 occupied parking spaces regardless of the size. This is a perfectly straight linear relationship, but with no explanatory significance; square footage in this case has no impact on parking demand.

Municipality: An incorporated village, town or city.

Number of Observations: The number of parking lot observations that were used for a particular analysis.

Other Variables Tested: This section of the land use analysis describes any other variables tested in addition to those within the data plot and equation.

Out parcel: A freestanding building(s) within a shopping center, that shares common a arrangement for maintenance with the shopping center, may be under common management with the shopping center, referred to under one common name but is separated from the shopping center by parking spaces and/or landscape features.

Outlier: An irregular observation. A “far outlier” may reflect a special event, some other unusual occurrence, or may be a measurement error.

Parking Generation Rates: The average number of occupied parking spaces per one unit of independent variable such as 1 space per 200 sq. ft.

Peak Rate: Is the highest hour of volume for parking utilization.

R^2: (see Coefficient of Determinations) Measure of correlation between two variables, expressed on a scale of -1 to +1. The closer to +1 the R^2 is, the better the correlation between the variables.

Range of Rates: The range between the largest sample observation and the smallest sample observation.

Regression Analysis: Is used to develop an equation that defines the line that creates a best fit through the data points.

Rural: The rural designation is classified by a density of 0.39 housing units per acre and less within a municipal boundary. This designation is defined as the least dense classification and is often associated with agriculture and open land. The study contains nine towns within Monroe County designated as rural locations.

Scatter plot: Shows the findings for one variable plotted against the findings of a second variable.

Standard Deviation: Measures the dispersion between data points around the calculated average. The lower the standard deviation the less dispersion there is between the data and therefore the better the data fit.

Suburban: The suburban designation is classified by a density of 0.40 to 3.99 housing units per acre within a municipal boundary. Suburban locations are those outside of the central city and are less dense than a city. Within this study there are ten towns and ten villages within Monroe County designated as suburban locations.

Transit Services: Transit service in the greater Rochester area is provided by the Rochester Genesee Regional Transportation Authority. See www.rgrta.org for more information.

Upper Bound Rate (95% c.i.): The facilities observed are a sample of the full population of facilities in the respective land use. Given the nature of sampling, there is always the possibility that the sample may be unrepresentative for a variety of reasons. The 95 % confidence rate is calculated from the sample and depends on the number and distribution of the observations. It indicates that the true average rate of peak parking spaces occupied is at or below the line. This assumes that the sample is random.

Urban: The urban designation is classified by a density of 4.0 housing units per acre within a municipal boundary. This designation can be defined as the central city or constituting city. Within this study only the sites located within the City of Rochester were considered urban.

APPENDIX G. URBAN, SUBURBAN, RURAL DESIGNATION

Rural		Suburban		Urban	
Municipality	*Density*	*Municipality*	*Density*	*Municipality*	*Density*
T. Rush	0.07	T. Chili	0.41	C. Rochester	4.20
T. Riga	0.09	T. Penfield	0.56		
T. Clarkson	0.10	T. Henrietta	0.57		
T. Wheatland	0.11	T. Pittsford	0.65		
T. Mendon	0.12	T. Webster	0.67		
T. Hamlin	0.12	V. Honeoye Falls	0.70		
T. Parma	0.20	T. Perinton	0.82		
T. Sweden	0.22	V. Churchville	1.03		
T. Ogden	0.29	T. Greece	1.17		
		T. Gates	1.23		
		V. Scottsville	1.23		
		V. Pittsford	1.48		
		V. Spencerport	1.62		
		V. Webster	1.64		
		T. Brighton	1.67		
		V. Brockport	1.83		
		V. Hilton	1.98		
		T. Irondequoit	2.14		
		V. Fairport	2.34		
		V. East Rochester	3.38		

Based on housing units per acre; US Census Bureau, Census 2000 SF 1[9]

[9] See Appendix H.

APPENDIX H. MONROE COUNTY MUNICIPALITY DATA

	Area (sq.mi.)	Area (acres)	Population	Average Household Size	Housing Units	Density (pop. per acre)	Density (h.u. per acre)
Monroe County	1,365.61	873,990	735,343	2.47	304,388	0.84	0.35
T. Brighton	15.63	10,003	35,588	2.14	16,705	3.56	1.67
V. Brockport	2.21	1,414	8,103	2.44	2,589	5.73	1.83
T. Chili	39.94	25,562	27,638	2.67	10,466	1.08	0.41
V. Churchville	1.14	730	1,887	2.59	753	2.59	1.03
T. Clarkson	33.23	21,267	6,072	2.86	2,090	0.29	0.10
V. East Rochester	1.35	864	6,650	2.34	2,916	7.70	3.38
V. Fairport	1.62	1,037	5,740	2.42	2,431	5.54	2.34
T. Gates	15.31	9,798	29,275	2.48	12,049	2.99	1.23
T. Greece	51.36	32,870	94,141	2.52	38,315	2.86	1.17
T. Hamlin	44.51	28,486	9,355	2.86	3,503	0.33	0.12
T. Henrietta	36.60	23,424	39,028	2.60	13,243	1.67	0.57
V. Hilton	1.68	1,075	5,856	2.80	2,128	5.45	1.98
V. Honeoye Falls	2.59	1,658	2,595	2.26	1,156	1.57	0.70
T. Irondequoit	16.82	10,765	52,354	2.32	23,037	4.86	2.14
T. Mendon	39.95	25,568	8,370	2.70	3,138	0.33	0.12
T. Ogden	36.79	23,546	18,492	2.78	6,740	0.79	0.29
T. Parma	42.94	27,482	14,822	2.77	5,502	0.54	0.20
T. Penfield	37.92	24,269	34,645	2.58	13,673	1.43	0.56
T. Perinton	34.44	22,042	46,090	2.59	18,041	2.09	0.82
T. Pittsford	23.38	14,963	27,219	2.65	9,709	1.82	0.65
V. Pittsford	0.69	442	1,418	2.23	652	3.21	1.48
T. Riga	35.30	22,592	5,437	2.75	2,018	0.24	0.09
C. Rochester	37.10	23,744	219,773	2.36	99,789	9.26	4.20
T. Rush	30.68	19,635	3,603	2.62	1,300	0.18	0.07
V. Scottsville	1.08	691	2,128	2.53	852	3.08	1.23
V. Spencerport	1.40	896	3,559	2.49	1,453	3.97	1.62
T. Sweden	33.71	21,574	13,716	2.52	4,843	0.64	0.22
T. Webster	35.49	22,714	37,926	2.56	15,218	1.67	0.67
V. Webster	2.20	1,408	5,216	2.30	2,304	3.70	1.64
T. Wheatland	30.70	19,648	5,149	2.55	2,093	0.26	0.11

Please Note: Village data is shown separately as well as being incorporated into town data.

Data Source: United States. Bureau of the Census. GCT-PH1. Population, Housing Units, Area, and Density 2000. Data Set: Census 2000 Summary File (SF 1) - 100 Percent Data. Geographic area: Monroe County, New York - County Subdivision and Place. 17 December 2003. http://factfinder.census.gov United States. Bureau of the Census. Fact Sheet. Monroe County, New York. 17 December 2003. <http://factfinder.census.gov>

APPENDIX I. SUGGESTED RESOURCES

Please see Monroe County Department of Planning and Development's website, www.monroecounty.gov for an additional list of parking publications and resources.

American Planning Association	http://www.planning.org/
American Society of Landscape Architects	http://www.asla.org/
Americans with Disabilities Act	http://www.usdoj.gov/crt/ada/
Federal Highway Administration (FHWA)	http://www.fhwa.dot.gov/
Genesee Transportation Council	http://www.gtcmpo.org/
Genesee/Finger Lakes Regional Planning Council	http://www.gflrpc.org/
Institute of Transportation Engineers	http://www.ite.org/
New York State, Division of Local Government	http://www.dos.state.ny.us/lgss/index.htm
Rochester Genesee Regional Transportation Authority	http://www.rgrta.org/
Urban Land Institute	http://www.uli.org/
Victoria Transport Policy Institute	http://www.vtpi.org/