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# **NORTHWEST CONNECTICUT PARKING STUDY**

**For:**

**NORTHWEST CONNECTICUT COUNCIL OF GOVERNMENTS  
LITCHFIELD HILLS COUNCIL OF ELECTED OFFICIALS**

**By:**

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**August 2002**

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## EXECUTIVE SUMMARY

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The Northwestern Connecticut Council of Governments (NWCCOG) and Litchfield Hills Council of Elected Officials (LHCEO) jointly sponsored the Northwest Connecticut Parking Study. The primary purpose of this study is to improve water quality in Northwest Connecticut by ultimately reducing the adverse effects of storm water runoff caused by impervious parking surfaces. Impervious parking surfaces seal the ground and result in prevention of rainfall infiltration and groundwater recharge. In addition, impervious parking lots contribute to increases in flooding, peak stream flows, stream channel erosion, and water pollution (NEMO 2002).

The goal of this study has been to examine current parking usage in the two regions, evaluate the amount of parking that is actually necessary for different land uses, and define strategies that might decrease impervious parking area. Two main tasks were completed as part of this study. A parking survey was conducted to obtain information about the usage of parking lots in the two regions. In addition, research into parking standards and strategies to reduce impervious parking area was performed.

The parking survey was administered at 42 locations within towns that are part of the NWCCOG and LHCEO regions. Each parking lot was visited on two separate dates. Parking lots serving the following land uses were surveyed:

- Banks
- Big Box Retail (e.g., Home Depot)
- Free-Standing Retail (e.g., CVS)
- Small Shopping Centers
- Drive-Thru Restaurants
- Restaurants
- Industrial Plants
- General Office Buildings
- Medical Office Buildings
- Nursing Homes

The surveyed parking lots were selected because the businesses they serve are free-standing (i.e., they serve one business or a small cluster of businesses); it is unlikely that people park in the lots and then walk to other businesses, so their parking usage is most illustrative of their own parking need. Zoning requirements in each community where lots were surveyed were compared to the amount of existing parking for each land use.

Several conclusions can be drawn from the survey results and the comparison of zoning requirements to parking lot usage. They include:

- The majority of the parking lots surveyed were underutilized. On average, 47.3 percent of the parking spaces were occupied.
- The amount of parking commonly provided at nursing homes appears to be most accurate in relationship to the demand. These parking lots were consistently more fully used than lots at other land uses.
- There was more excess parking provided at big box retail locations than for any other land use. The big box lots were, on average, only 24.3 percent occupied when surveyed.
- In some cases, the demand for parking was observed to be less than what is required by zoning, but more parking was provided than what was required by zoning.
- The majority of the parking lots surveyed had occupancy rates much lower than the target rate of 85 to 95 percent (Papacostas et al. 1993).

Research was performed to determine some useful strategies to reduce or limit the amount of impervious parking area. The primary strategies that were identified as applicable to northwestern Connecticut include amending parking standards, encouraging shared parking, and constructing parking of pervious materials. The research conducted was not intended to comprehensively cover each of these strategies, but provides a starting point from which more specific techniques tailored to each community can be developed in the future.

Any combination of the strategies mentioned above may be used to reduce the impervious area of parking lots in northwestern Connecticut. One key conclusion, however, is that parking demand needs to be more accurately quantified if parking standards in zoning regulations are to provide for the amount of parking actually appropriate to a specific land use. Changes to zoning regulations would be the most direct way to implement the applicable strategies.

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## 1. INTRODUCTION

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The Northwestern Connecticut Council of Governments (NWCCOG) and Litchfield Hills Council of Elected Officials (LHCEO) are jointly sponsoring the Northwest Connecticut Parking Study. The primary purpose of this study is to improve water quality in Northwest Connecticut by ultimately reducing the adverse effects of storm water runoff caused by impervious parking surfaces. Impervious parking surfaces seal the ground and result in prevention of rainfall infiltration and groundwater recharge. In addition, impervious parking lots contribute to increases in flooding, peak stream flows, stream channel erosion, and water pollution (NEMO 2002).

The goal of this study is to examine current parking usage in the two regions, evaluate the amount of parking that is actually necessary for different land uses, and define strategies that might decrease impervious parking area. This study included two elements: a parking survey was conducted to obtain information about the usage of parking lots in the two regions; and parking standards and strategies were researched or identified through research.

This report presents the parking survey methodology and results; a comparison to zoning requirements, which summarizes the number of parking spaces required by local zoning and compares it to the actual number of parking spaces; a discussion of potential strategies for reducing impervious pavement area in parking lots; and recommendations for implementation.

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## 2. PARKING SURVEY

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### 2.1. SURVEY PURPOSE

The main purpose of the parking survey was to document the number of available parking spaces and the usage of parking lots for stand-alone land uses in the towns within the NWCCOG and LHCEO planning regions. To obtain redundancy of sampling, several parking lots of each land use type were surveyed during expected peak usage times.

### 2.2. SURVEY DESIGN

A parking survey form as presented in Appendix A was used by surveyors to document the size of each parking lot, including the number of handicapped spaces and the number of regular spaces as well as the percentage of each lot that is paved or gravel and the percentage of each lot that is lined (i.e., painted white lines to define the parking space area) or unlined (i.e., no painted white lines to define the parking space area). In addition, the surveyors recorded the number of occupied handicapped parking spaces and the number of occupied regular spaces. The surveyors also counted the number of vehicles arriving and departing in a 10-minute period to roughly gauge the turnover. The rationale for estimating the turnover was that some land uses may require less parking if vehicles enter and exit frequently. Other items recorded on the survey form included the presence of landscaping, lighting, trees, drainage structures, and grassy drainage swales. The vegetation from landscaping and grassy drainage swales reduces the amount of storm water runoff, provides filtration, and improves water quality.

## METHODOLOGY

The parking survey was administered at 42 locations within towns that are part of the NWCCOG and LHCEO regions. The locations of the parking lots are shown in Figure 2.1 (4) and are listed in Table 2.1 (5). Surveyors consisted of employees of Fitzgerald & Halliday, Inc., NWCCOG, and LHCEO. Each parking lot was visited on two separate dates at times generally estimated to be peak use periods. Parking lots serving the following land uses were surveyed:

- Banks
- Big Box Retail (e.g., Home Depot)
- Free-Standing Retail (e.g., CVS)
- Small Shopping Centers
- Drive-Thru Restaurants
- Restaurants
- Industrial Plants

- General Office Buildings
- Medical Office Buildings
- Nursing Homes

The surveyed parking lots were selected because the businesses they serve are free-standing (i.e., they serve one business or a small cluster of businesses); it is unlikely that people park in the lots and then walk to other businesses, so their parking usage is most illustrative of their own parking need.

Area type (urban, suburban, rural) of the parking lots was originally considered, but distinction of area type is difficult, as the entire study area is generally considered rural. Usage of the parking lots was expected to be relatively independent of the area types because of the free-standing nature of the businesses that the parking lots serve. The parking lots were not located in core downtown areas, with the exception of Paris Park in Torrington, which was very close to the core downtown area.

The parking survey was carried out from Wednesday, November 28, 2001, through Monday, December 17, 2001, with the exception of the Home Depot in New Hartford, which was surveyed on Saturday, January 26, 2002, and Monday, January 28, 2002. The survey times and dates for each parking lot are shown in Table 2.2 (6-8). The targeted survey times were based on anticipated peak parking lot usage as follows:

- Offices and Banks – between 10 AM and 3 PM
- Nursing Homes – around 3 PM shift change
- Restaurants and Drive-Thru Restaurants – around 12 PM
- Industrial – any time during the workday
- Big Box Retail – Saturday afternoon
- Free-Standing Retail – between 12 PM and 4 PM
- Small Shopping Centers – not specific

It should be noted that the sample size for the number of parking lots and the number of observations was limited, constrained by the resources available for this study effort. Observations of each parking lot were limited to approximately 10 minutes per survey and each lot was surveyed for usage only twice. The number of parking lots surveyed in each land use category ranged from two to eight. A broader survey would be useful to confirm the results of this sample.

**Figure 2.1**

(Insert Figure 2.1 graphic here)

**Table 2.1  
Parking Lots Surveyed**

<b>ID</b>	<b>Town</b>	<b>Business Name</b>	<b>Land Use Category</b>
1	Barkhamsted	Pleasant Valley Center	Small Shopping Center
2	New Hartford	Blimpie's	Drive-Thru Restaurant
3	Barkhamsted	Log House Restaurant	Restaurant
4	Torrington	Paris Park	General Office Building
5	Goshen	Dymax	Industrial Plant
6	Torrington	Wittman	Industrial Plant
7	Torrington	NIDEC	Industrial Plant
8	Torrington	Rexam	Industrial Plant
9	Torrington	Torrington Brass and Steel	Industrial Plant
10	Barkhamsted	Winsted Hospital for Animals	Medical Office Building
11	Kent	The Kent	Nursing Home
12	Salisbury	Lakeville Professional	General Office Building
13	Salisbury	National Iron Bank	Bank
14	Sharon	Sharon Shopping Center	Small Shopping Center
15	North Canaan	The Shrope Foundation Inc.	Nursing Home
16	Sharon	Union Bank	Bank
17	Harwinton	Thomaston Savings Bank	Bank
18	Harwinton	Harwinton Plaza	Small Shopping Center
19	Litchfield	True Value	Free-Standing Retail
20	Litchfield	CVS	Free-Standing Retail
21	Litchfield (Bantam)	Big Value Supermarket	Free-Standing Retail
22	North Canaan	Stop n Shop	Big Box Retail
23	North Canaan	Canaan Auto Supply	Free-Standing Retail
24	North Canaan	McDonalds	Drive-Thru Restaurant
25	Washington	Chuck Wagon	Restaurant
26	Washington	Stonemill Commons	Small Shopping Center
27	Torrington	Borgeson	Industrial Plant
28	Torrington	One Torrington Office Plaza	Medical Office Building
29	Torrington	Medical Offices Building	Medical Office Building
30	Torrington	Seitz	Industrial Plant
31	Winchester (Winsted)	Winsted Precision Ball	Industrial Plant
32	Torrington	Valerie Manor	Nursing Home
33	Winchester (Winsted)	KFC	Drive-Thru Restaurant
34	Torrington	CHH Walkin	Medical Office Building
35	Canaan (Falls Village)	Torrington Savings Bank	Bank
36	Torrington	Litchfield Woods	Nursing Home
37	Torrington	Chamber of Commerce Building	General Office Building
38	Torrington	Applebee's	Restaurant
39	Torrington	Wendy's	Drive-Thru Restaurant
40	Litchfield	The Main Course	Restaurant
41	Torrington	Sovereign Bank	Bank
42	New Hartford	Home Depot	Big Box Retail

**Table 2.2**  
**Survey Dates and Times**

<b>ID</b>	<b>Town</b>	<b>Business Name</b>	<b>Category</b>	<b>Date</b>	<b>Day of Week</b>	<b>From</b>	<b>To</b>
13	Salisbury	National Iron Bank	Bank	11/30/01	Friday	11:20	11:30
13	Salisbury	National Iron Bank	Bank	12/14/01	Friday	12:15	12:25
41	Torrington	Sovereign Bank	Bank	11/30/01	Friday	10:30	10:40
41	Torrington	Sovereign Bank	Bank	12/6/01	Thursday	11:03	11:13
17	Harwinton	Thomaston Savings Bank	Bank	11/28/01	Wednesday	10:40	10:55
17	Harwinton	Thomaston Savings Bank	Bank	12/5/01	Wednesday	12:25	12:45
35	Canaan (Falls Village)	Torrington Savings Bank	Bank	11/29/01	Thursday	11:50	12:00
35	Canaan (Falls Village)	Torrington Savings Bank	Bank	12/14/01	Friday	11:50	12:00
16	Sharon	Union Bank	Bank	11/28/01	Wednesday	1:22	1:35
16	Sharon	Union Bank	Bank	12/4/01	Tuesday	1:30	1:45
42	New Hartford	Home Depot	Big Box Retail	1/26/02	Saturday	11:15	11:30
42	New Hartford	Home Depot	Big Box Retail	1/28/02	Monday	3:35	3:45
22	North Canaan	Stop n Shop	Big Box Retail	11/29/01	Thursday	11:00	11:30
22	North Canaan	Stop n Shop	Big Box Retail	12/8/01	Saturday	11:30	11:40
2	New Hartford	Blimpie's	Drive-Thru Restaurant	12/6/01	Thursday	11:40	11:50
2	New Hartford	Blimpie's	Drive-Thru Restaurant	11/30/01	Friday	12:15	12:25
33	Winchester (Winsted)	KFC	Drive-Thru Restaurant	12/6/01	Thursday	12:10	12:20
33	Winchester (Winsted)	KFC	Drive-Thru Restaurant	11/30/01	Friday	12:35	12:45
24	North Canaan	McDonalds	Drive-Thru Restaurant	12/8/01	Saturday	12:00	12:10
24	North Canaan	McDonalds	Drive-Thru Restaurant	11/29/01	Thursday	12:15	12:25
39	Torrington	Wendy's	Drive-Thru Restaurant	11/29/01	Thursday	12:05	12:15
39	Torrington	Wendy's	Drive-Thru Restaurant	12/6/01	Thursday	12:41	12:51
21	Litchfield (Bantam)	Big Value Supermarket	Free-Standing Retail	12/1/01	Saturday	11:30	11:40
21	Litchfield (Bantam)	Big Value Supermarket	Free-Standing Retail	12/8/01	Saturday	1:25	1:35
23	North Canaan	Canaan Auto Supply	Free-Standing Retail	12/8/01	Saturday	11:45	11:55
23	North Canaan	Canaan Auto Supply	Free-Standing Retail	11/29/01	Thursday	12:00	12:10
20	Litchfield	CVS	Free-Standing Retail	12/1/01	Saturday	11:00	11:10
20	Litchfield	CVS	Free-Standing Retail	12/8/01	Saturday	1:55	2:05

**Table 2.2 (cont.)  
Survey Dates and Times**

<b>ID</b>	<b>Town</b>	<b>Business Name</b>	<b>Category</b>	<b>Date</b>	<b>Day of Week</b>	<b>From</b>	<b>To</b>
19	Litchfield	True Value	Free-Standing Retail	12/8/01	Saturday	11:10	11:20
19	Litchfield	True Value	Free-Standing Retail	12/1/01	Saturday	12:20	12:35
37	Torrington	Chamber of Commerce Building	General Office Building	12/6/01	Thursday	1:27	1:37
37	Torrington	Chamber of Commerce Building	General Office Building	11/29/01	Thursday	1:30	1:40
12	Salisbury	Lakeville Professional	General Office Building	11/28/01	Wednesday	1:02	1:20
12	Salisbury	Lakeville Professional	General Office Building	12/14/01	Friday	2:30	2:45
4	Torrington	Paris Park	General Office Building	11/29/01	Thursday	1:30	1:55
4	Torrington	Paris Park	General Office Building	11/28/01	Wednesday	12:30	12:40
27	Torrington	Borgeson	Industrial Plant	11/28/01	Wednesday	10:50	11:10
27	Torrington	Borgeson	Industrial Plant	11/29/01	Thursday	1:50	12:00
5	Goshen	Dymax	Industrial Plant	12/13/01	Thursday	1:00	1:10
5	Goshen	Dymax	Industrial Plant	12/17/01	Monday	2:20	2:30
7	Torrington	NIDEC	Industrial Plant	12/5/01	Wednesday	8:45	8:50
7	Torrington	NIDEC	Industrial Plant	12/5/01	Wednesday	1:25	1:35
8	Torrington	Rexam	Industrial Plant	12/12/01	Wednesday	8:45	8:50
8	Torrington	Rexam	Industrial Plant	12/5/01	Wednesday	12:50	1:00
30	Torrington	Seitz	Industrial Plant	11/28/01	Wednesday	9:45	10:00
30	Torrington	Seitz	Industrial Plant	11/29/01	Thursday	1:15	1:25
9	Torrington	Torrington Brass and Steel	Industrial Plant	12/5/01	Wednesday	8:55	9:00
9	Torrington	Torrington Brass and Steel	Industrial Plant	12/12/01	Wednesday	9:00	9:10
31	Winchester (Winsted)	Winsted Precision Ball	Industrial Plant	12/6/01	Thursday	11:55	12:05
31	Winchester (Winsted)	Winsted Precision Ball	Industrial Plant	11/30/01	Friday	1:10	1:20
6	Torrington	Wittman	Industrial Plant	12/5/01	Wednesday	8:45	8:55
6	Torrington	Wittman	Industrial Plant	12/12/01	Wednesday	9:10	9:15
34	Torrington	CHH Walkin	Medical Office Building	12/6/01	Thursday	10:45	10:55
34	Torrington	CHH Walkin	Medical Office Building	11/29/01	Thursday	12:45	12:55
29	Torrington	Medical Offices Building	Medical Office Building	11/28/01	Wednesday	12:55	1:05
29	Torrington	Medical Offices Building	Medical Office Building	11/29/01	Thursday	2:10	2:20

**Table 2.2 (cont.)  
Survey Dates and Times**

<b>ID</b>	<b>Town</b>	<b>Business Name</b>	<b>Category</b>	<b>Date</b>	<b>Day of Week</b>	<b>From</b>	<b>To</b>
28	Torrington	One Torrington Office Plaza	Medical Office Building	11/28/01	Wednesday	11:45	12:05
28	Torrington	One Torrington Office Plaza	Medical Office Building	11/29/01	Thursday	1:35	1:45
10	Barkhamsted	Winsted Hospital for Animals	Medical Office Building	12/12/01	Wednesday	12:10	12:20
10	Barkhamsted	Winsted Hospital for Animals	Medical Office Building	12/6/01	Thursday	1:10	1:20
36	Torrington	Litchfield Woods	Nursing Home	12/6/01	Thursday	11:30	11:40
36	Torrington	Litchfield Woods	Nursing Home	11/29/01	Thursday	2:50	3:00
11	Kent	The Kent	Nursing Home	11/30/01	Friday	11:50	12:02
11	Kent	The Kent	Nursing Home	12/4/01	Tuesday	2:08	2:42
15	North Canaan	The Shrope Foundation Inc.	Nursing Home	12/4/01	Tuesday	11:00	11:10
15	North Canaan	The Shrope Foundation Inc.	Nursing Home	12/14/01	Friday	11:10	11:20
32	Torrington	Valerie Manor	Nursing Home	12/6/01	Thursday	1:50	2:00
32	Torrington	Valerie Manor	Nursing Home	11/29/01	Thursday	3:15	3:25
38	Torrington	Applebee's	Restaurant	11/29/01	Thursday	12:20	12:30
38	Torrington	Applebee's	Restaurant	12/6/01	Thursday	12:24	12:34
25	Washington	Chuck Wagon	Restaurant	12/1/01	Saturday	12:45	12:55
25	Washington	Chuck Wagon	Restaurant	12/8/01	Saturday	12:55	1:05
3	Barkhamsted	Log House Restaurant	Restaurant	11/30/01	Friday	12:50	1:00
3	Barkhamsted	Log House Restaurant	Restaurant	12/6/01	Thursday	12:00	12:10
40	Litchfield	The Main Course	Restaurant	12/6/01	Thursday	11:55	12:05
40	Litchfield	The Main Course	Restaurant	12/1/01	Saturday	1:25	1:35
18	Harwinton	Harwinton Plaza	Small Shopping Center	12/5/01	Wednesday	12:05	12:25
18	Harwinton	Harwinton Plaza	Small Shopping Center	11/28/01	Wednesday	12:08	12:20
1	Barkhamsted	Pleasant Valley Center	Small Shopping Center	12/6/01	Thursday	11:25	11:35
1	Barkhamsted	Pleasant Valley Center	Small Shopping Center	11/30/01	Friday	1:40	1:50
14	Sharon	Sharon Shopping Center	Small Shopping Center	11/28/01	Wednesday	10:53	11:03
14	Sharon	Sharon Shopping Center	Small Shopping Center	12/4/01	Tuesday	1:45	2:00
26	Washington	Stonemill Commons	Small Shopping Center	12/1/01	Saturday	12:30	12:40
26	Washington	Stonemill Commons	Small Shopping Center	12/8/01	Saturday	1:10	1:20

## **SURVEY RESULTS**

The 42 parking lots were surveyed twice to yield 84 completed survey forms. Table 2.3 provides a summary of the survey results. Results of primary importance are the occupancy rates of the parking lots for each type of land use. The charts in the top half of Figures 2.2 through 2.11 (14-23) show the percent of occupied regular spaces for each visit to each parking lot by land use. These data are also shown in tabular form in Appendix B.

In addition to occupancy rates for each parking lot, the ratio of parking to building size was examined. The charts in the bottom half of Figure 2.2 through 2.11 (14-23) show the number of occupied spaces per 1,000 square feet of building area for each visit as well as the total number of regular spaces available per 1,000 square feet of building area. These data are also shown in the table in Appendix C. The ratio of parking to building size is shown because the sizes of the buildings and associated parking lots varied substantially within each land use category. For example, the CVS in Litchfield is a much smaller building with less parking than the Big Value Supermarket in Bantam. In order to be able to more accurately correlate and assess the occupancy of these lots in relation to one another, a common denominator was needed. The ratio of parking spaces to building square footage provides that common denominator.

The upper chart of Figure 2.12 (23) shows the average percentage of regular parking spaces that were occupied for each of the land use categories. The lower chart for Figure 2.12 (23) shows the average ratio of occupied regular spaces and average available regular spaces per 1000 S.F. of building area for each land use.

Survey data results for each land use are described below. The list of bullets point out average, high, and low occupancy rates, as well as the parking lots with the maximum number of unoccupied parking spaces for each land use category.

### **Bank Parking Lots**

- A total of five bank parking lots were surveyed.
- On average, 36.1 percent of the regular parking spaces were occupied.
- Usage ranged from a low of 14.3 percent to a high of 59.1 percent.
- The parking lot at the Sovereign Bank was the least occupied of the bank lots surveyed. It was only 23.8 percent occupied (regular parking spaces).
- Sovereign Bank provided more than 4 times\* more parking than was occupied.

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\* Calculated by comparing the total number of available parking spaces to the number of occupied parking spaces of the visit with the higher occupancy

**Table 2.3  
Summary of Survey Results**

<b>Business Name</b>	<b>Lot Type</b>	<b>Building Area (S.F.)</b>	<b>Number of Regular Spaces</b>	<b>Number of Occupied Regular Spaces</b>	<b>Percentage of Occupied Regular Spaces</b>	<b>Actual Number of Regular Spaces per 1,000 S.F. Building Area</b>	<b>Number of Occupied Spaces per 1,000 S.F. Building Area</b>
<b>Banks</b>							
National Iron Bank	Paved and Lined	2,964	10	4	40.0	3.4	1.3
National Iron Bank	Paved and Lined	2,964	10	5	50.0	3.4	1.7
Sovereign Bank	Paved and Lined	2,160	21	5	23.8	9.7	2.3
Sovereign Bank	Paved and Lined	2,160	21	3	14.3	9.7	1.4
Thomaston Savings Bank	Paved and Lined	3,026	20	6	30.0	6.6	2.0
Thomaston Savings Bank	Paved and Lined	3,026	20	5	25.0	6.6	1.7
Torrington Savings Bank	Paved and Partially Lined or Unlined	2,060	10	2	20.0	4.9	1.0
Torrington Savings Bank	Paved and Partially Lined or Unlined	2,060	10	4	40.0	4.9	1.9
Union Bank	Paved and Partially Lined or Unlined	4,962	22	13	59.1	4.4	2.6
Union Bank	Paved and Partially Lined or Unlined	4,962	22	13	59.1	4.4	2.6
<b>Big Box Retail</b>							
Home Depot	Paved and Lined	116,728	571	204	35.7	4.9	1.7
Home Depot	Paved and Lined	116,728	571	76	13.3	4.9	0.7
Stop n Shop	Paved and Lined	25,129	164	25	15.2	6.5	1.0
Stop n Shop	Paved and Lined	25,129	164	54	32.9	6.5	2.1
<b>Drive-Thru Restaurants</b>							
Blimpie's	Paved and Partially Lined or Unlined	11,980	12	8	66.7	1.0	0.7
Blimpie's	Paved and Partially Lined or Unlined	11,980	12	6	50.0	1.0	0.5
KFC	Paved and Lined	2,481	21	6	28.6	8.5	2.4
KFC	Paved and Lined	2,481	21	7	33.3	8.5	2.8
McDonalds	Paved and Lined	3,912	64	16	25.0	16.4	4.1
McDonalds	Paved and Lined	3,912	64	24	37.5	16.4	6.1
Wendy's	Paved and Lined	3,382	41	41	100.0	12.1	12.1

**Table 2.3 (cont.)  
Summary of Survey Results**

<b>Business Name</b>	<b>Lot Type</b>	<b>Building Area (S.F.)</b>	<b>Number of Regular Spaces</b>	<b>Number of Occupied Regular Spaces</b>	<b>Percentage of Occupied Regular Spaces</b>	<b>Actual Number of Regular Spaces per 1,000 S.F. Building Area</b>	<b>Number of Occupied Spaces per 1,000 S.F. Building Area</b>
<b>Drive-Thru Restaurants (cont.)</b>							
Wendy's	Paved and Lined	3,382	41	41	100.0	12.1	12.1
<b>Free-Standing Retail</b>							
Big Value Supermarket	Paved and Lined	14,731	69	28	40.6	4.7	1.9
Big Value Supermarket	Paved and Lined	14,731	69	18	26.1	4.7	1.2
Canaan Auto Supply*	Paved and Partially Lined or Unlined	6,000	5	5	100.0	0.8	0.8
Canaan Auto Supply*	Paved and Partially Lined or Unlined	6,000	5	4	80.0	0.8	0.7
CVS	Paved and Lined	7,260	79	20	25.3	10.9	2.8
CVS	Paved and Lined	7,260	79	15	19.0	10.9	2.1
True Value*	Partially Paved and Partially Lined or Unlined	16,502	42	16	38.1	2.5	1.0
True Value*	Partially Paved and Partially Lined or Unlined	16,502	42	20	47.6	2.5	1.2
<b>General Office Buildings</b>							
Chamber of Commerce Building	Paved and Lined	11,596	127	52	40.9	11.0	4.5
Chamber of Commerce Building	Paved and Lined	11,596	127	49	38.6	11.0	4.2
Lakeville Professional	Unpaved and Unlined	2,681	15	2	13.3	5.6	0.7
Lakeville Professional	Unpaved and Unlined	2,681	15	7	46.7	5.6	2.6
Paris Park	Paved and Lined	10,725	19	18	94.7	1.8	1.7
Paris Park	Paved and Lined	10,725	19	12	63.2	1.8	1.1
<b>Industrial Plants</b>							
Borgeson	Paved and Partially Lined or Unlined	26,466	41	11	26.8	1.5	0.4
Borgeson	Paved and Partially Lined or Unlined	26,466	41	7	17.1	1.5	0.3
Dymax*	Unpaved and Unlined	10,500	43	19	44.2	4.1	1.8
Dymax*	Unpaved and Unlined	10,500	43	17	39.5	4.1	1.6
NIDEC	Paved and Lined	93,750	171	65	38.0	1.8	0.7
NIDEC	Paved and Lined	93,750	171	65	38.0	1.8	0.7

**Table 2.3 (cont.)  
Summary of Survey Results**

<b>Business Name</b>	<b>Lot Type</b>	<b>Building Area (S.F.)</b>	<b>Number of Regular Spaces</b>	<b>Number of Occupied Regular Spaces</b>	<b>Percentage of Occupied Regular Spaces</b>	<b>Actual</b>	<b>Number of</b>
						<b>Regular Spaces per 1,000 S.F. Building Area</b>	<b>Occupied Spaces per 1,000 S.F. Building Area</b>
<b>Industrial Plants (cont.)</b>							
Rexam*	Paved and Partially Lined or Unlined	53,300	164	46	28.0	3.1	0.9
Rexam*	Paved and Partially Lined or Unlined	53,300	164	56	34.1	3.1	1.1
Seitz	Paved and Partially Lined or Unlined	78,300	212	45	21.2	2.7	0.6
Seitz	Paved and Partially Lined or Unlined	78,300	212	37	17.5	2.7	0.5
Torrington Brass and Steel*	Paved and Partially Lined or Unlined	58,625	76	26	34.2	1.3	0.4
Torrington Brass and Steel*	Paved and Partially Lined or Unlined	58,625	76	44	57.9	1.3	0.8
Winsted Precision Ball	Paved and Lined	49,004	63	58	92.1	1.3	1.2
Winsted Precision Ball	Paved and Lined	49,004	63	44	69.8	1.3	0.9
Wittman	Paved and Lined	34,920	81	54	66.7	2.3	1.5
Wittman	Paved and Lined	34,920	81	42	51.9	2.3	1.2
<b>Medical Office Buildings</b>							
CHH Walkin	Paved and Lined	6,540	32	22	68.8	4.9	3.4
CHH Walkin	Paved and Lined	6,540	32	9	28.1	4.9	1.4
Medical Offices Building	Paved and Lined	8,756	115	73	63.5	13.1	8.3
Medical Offices Building	Paved and Lined	8,756	115	75	65.2	13.1	8.6
One Torrington Office Plaza	Paved and Partially Lined or Unlined	36,360	83	27	32.5	2.3	0.7
One Torrington Office Plaza	Paved and Partially Lined or Unlined	36,360	83	41	49.4	2.3	1.1
Winsted Hospital for Animals	Paved and Partially Lined or Unlined	15,572	29	10	34.5	1.9	0.6
Winsted Hospital for Animals	Paved and Partially Lined or Unlined	15,572	29	9	31.0	1.9	0.6
<b>Nursing Homes</b>							
Litchfield Woods	Partially Paved and Partially Lined or Unlined	76,241	95	79	83.2	1.2	1.0
Litchfield Woods	Partially Paved and Partially Lined or Unlined	76,241	95	70	73.7	1.2	0.9
The Kent	Paved and Lined	63,711	103	32	31.1	1.6	0.5
The Kent	Paved and Lined	63,711	103	32	31.1	1.6	0.5

**Table 2.3 (cont.)  
Summary of Survey Results**

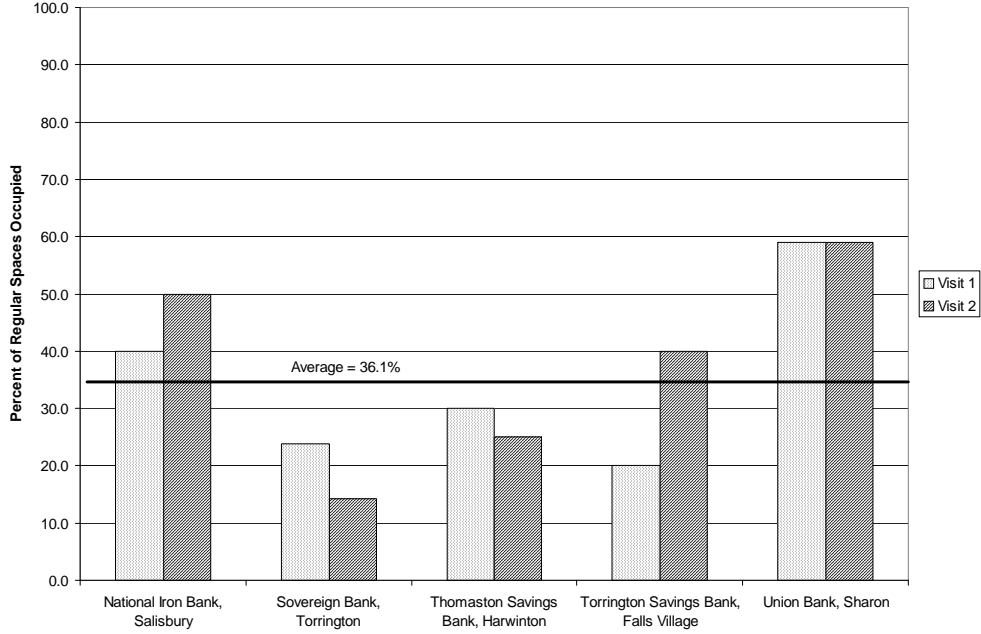
<b>Business Name</b>	<b>Lot Type</b>	<b>Building Area (S.F.)</b>	<b>Number of Regular Spaces</b>	<b>Number of Occupied Regular Spaces</b>	<b>Percentage of Occupied Regular Spaces</b>	<b>Actual Number of Regular Spaces per 1,000 S.F. Building Area</b>	<b>Number of Occupied Spaces per 1,000 S.F. Building Area</b>
<b>Nursing Homes (cont.)</b>							
The Shrope Foundation Inc.*	Unpaved and Unlined	3,081	15	9	60.0	4.9	2.9
The Shrope Foundation Inc.*	Unpaved and Unlined	3,081	15	6	40.0	4.9	1.9
Valerie Manor	Paved and Lined	76,930	77	74	96.1	1.0	1.0
Valerie Manor	Paved and Lined	76,930	77	38	49.4	1.0	0.5
<b>Restaurants</b>							
Applebee's	Paved and Lined	5,586	103	45	43.7	18.4	8.1
Applebee's	Paved and Lined	5,586	103	40	38.8	18.4	7.2
Chuck Wagon	Paved and Lined	2,699	30	22	73.3	11.1	8.2
Chuck Wagon	Paved and Lined	2,699	30	30	100.0	11.1	11.1
Log House Restaurant	Partially Paved and Partially Lined or Unlined	4,978	58	27	46.6	11.7	5.4
Log House Restaurant	Partially Paved and Partially Lined or Unlined	4,978	58	36	62.1	11.7	7.2
The Main Course	Partially Paved and Partially Lined or Unlined	3,184	48	15	31.3	15.1	4.7
The Main Course	Partially Paved and Partially Lined or Unlined	3,184	48	19	39.6	15.1	6.0
<b>Small Shopping Centers</b>							
Harwinton Plaza	Partially Paved and Partially Lined or Unlined	5,950	50	23	46.0	8.4	3.9
Harwinton Plaza	Partially Paved and Partially Lined or Unlined	5,950	50	32	64.0	8.4	5.4
Pleasant Valley Center	Paved and Lined	2,966	14	9	64.3	4.7	3.0
Pleasant Valley Center	Paved and Lined	2,966	14	11	78.6	4.7	3.7
Sharon Shopping Center	Paved and Lined	20,882	111	62	55.9	5.3	3.0
Sharon Shopping Center	Paved and Lined	20,882	111	62	55.9	5.3	3.0
Stonemill Commons	Paved and Lined	6,621	25	11	44.0	3.8	1.7
Stonemill Commons	Paved and Lined	6,621	25	10	40.0	3.8	1.5

Source: Fitzgerald & Halliday, Inc., February 2002

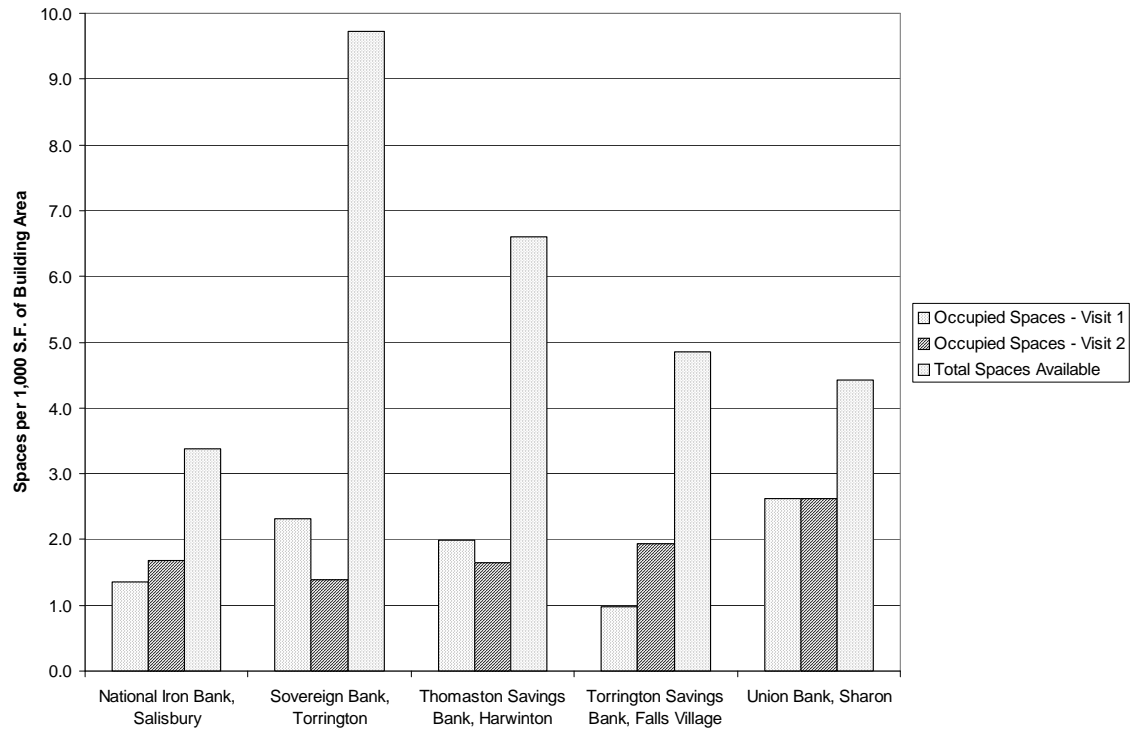
\* Unlined lot. Spaces estimated as follows: Paved Area divided by 300 S.F. (ITE 1999)

**Figure 2.2  
Survey Results for Banks**

**Parking Lot Occupancy (Percent of Regular Spaces Occupied per Visit)**

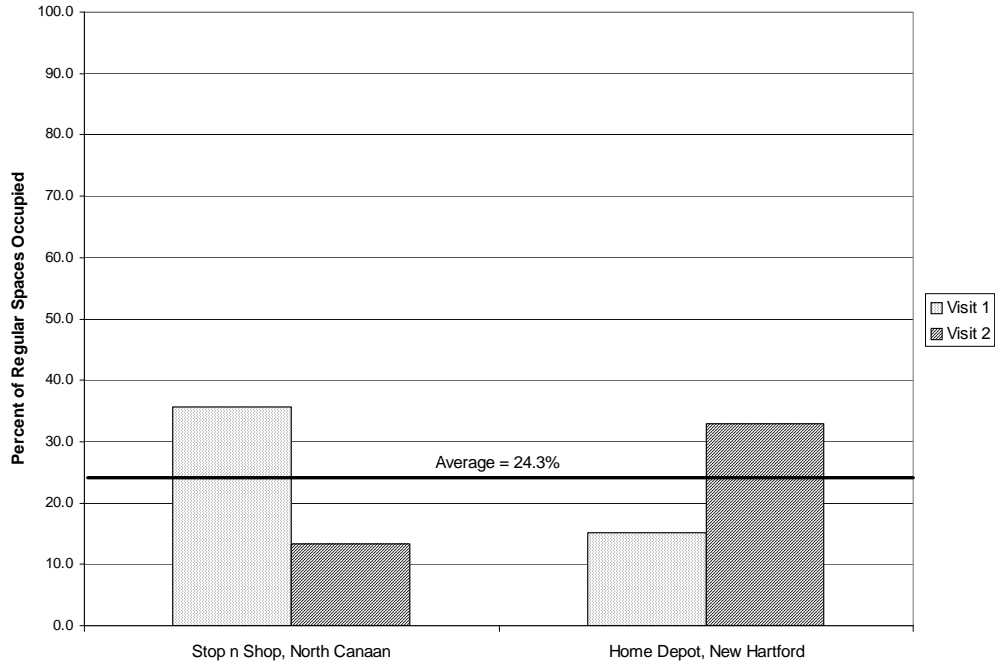


**Ratio of Parking Spaces to Building Size**

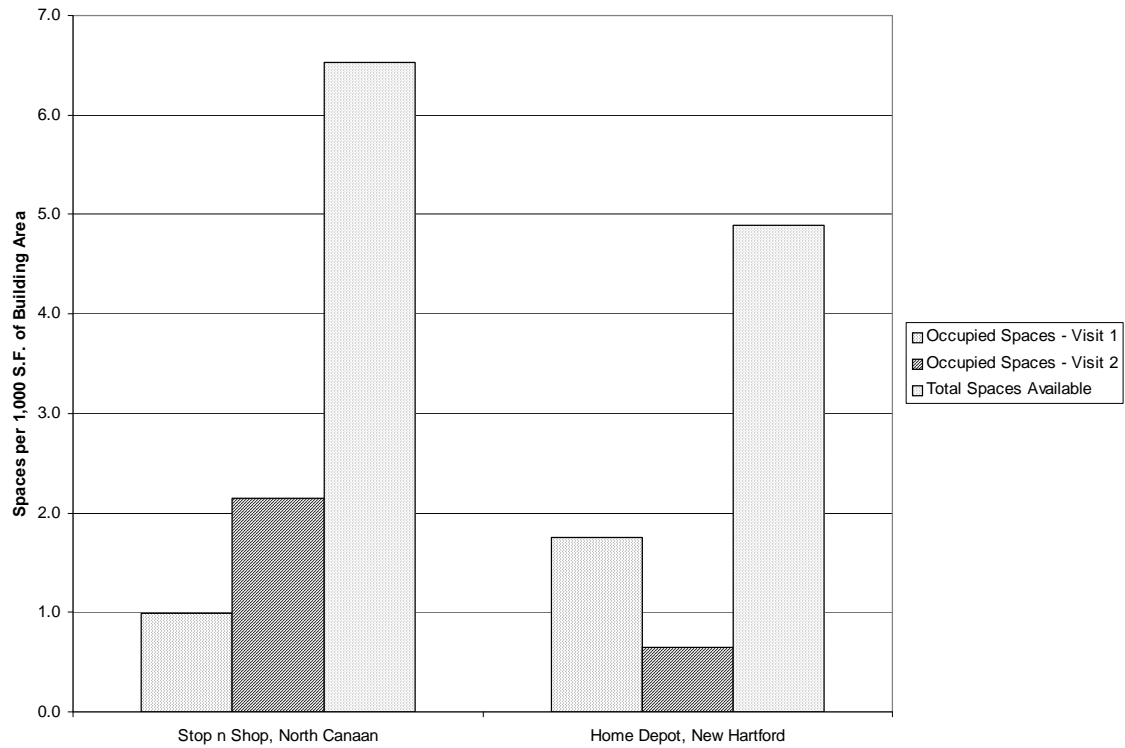


**Figure 2.3**  
**Survey Results for Big Box Retail**

**Parking Lot Occupancy (Percent of Regular Spaces Occupied per Visit)**

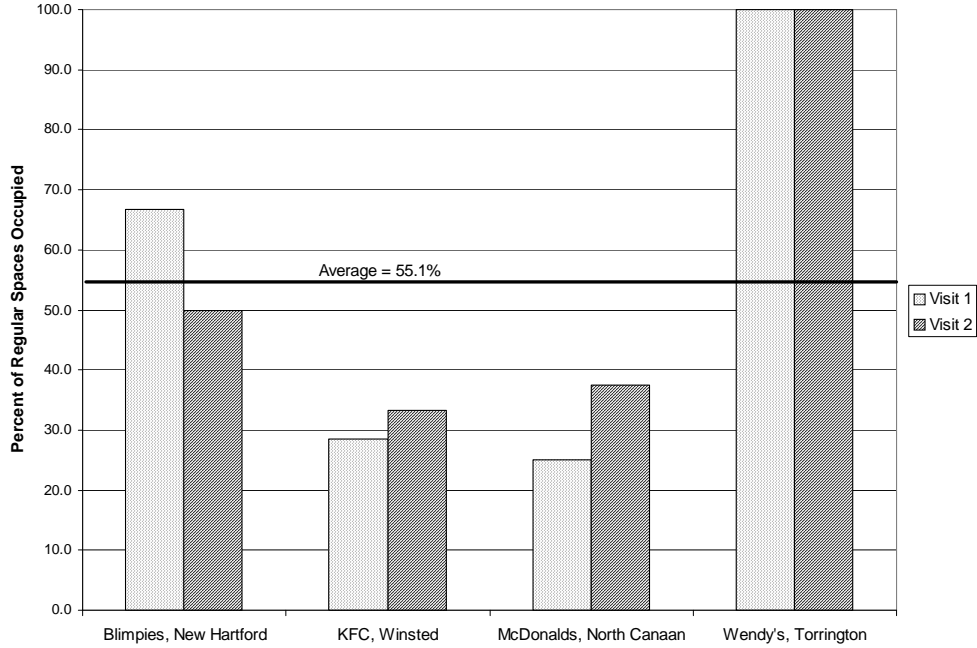


**Ratio of Parking Spaces to Building Size**

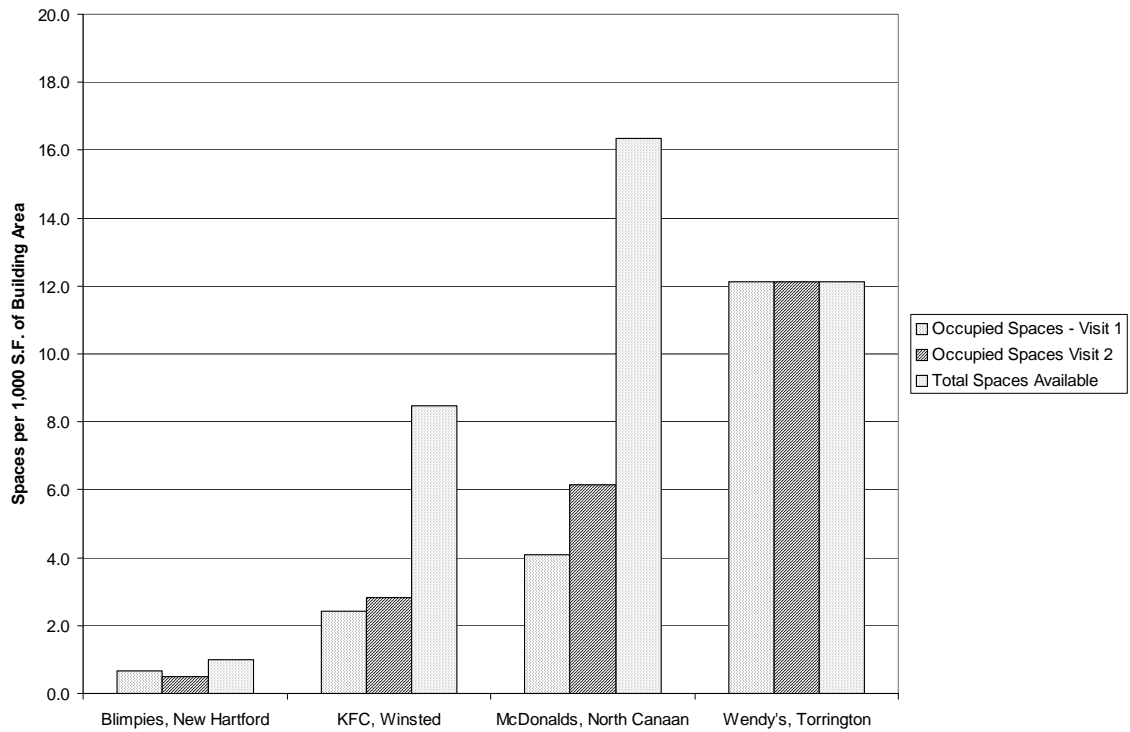


**Figure 2.4**  
**Survey Results for Drive-Thru Restaurants**

**Parking Lot Occupancy (Percent of Regular Spaces Occupied per Visit)**

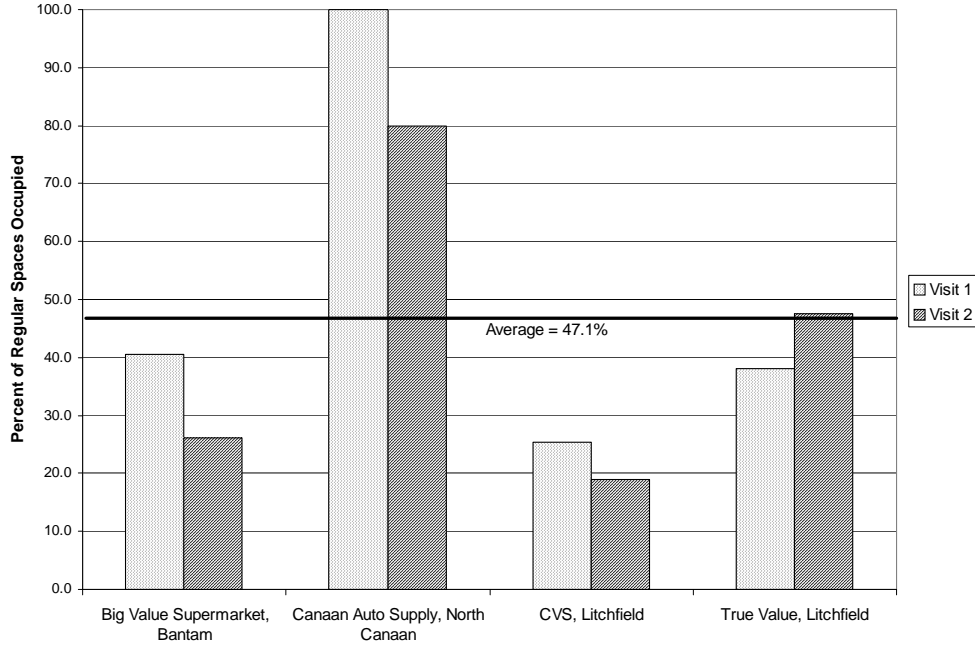


**Ratio of Parking Spaces to Building Size**

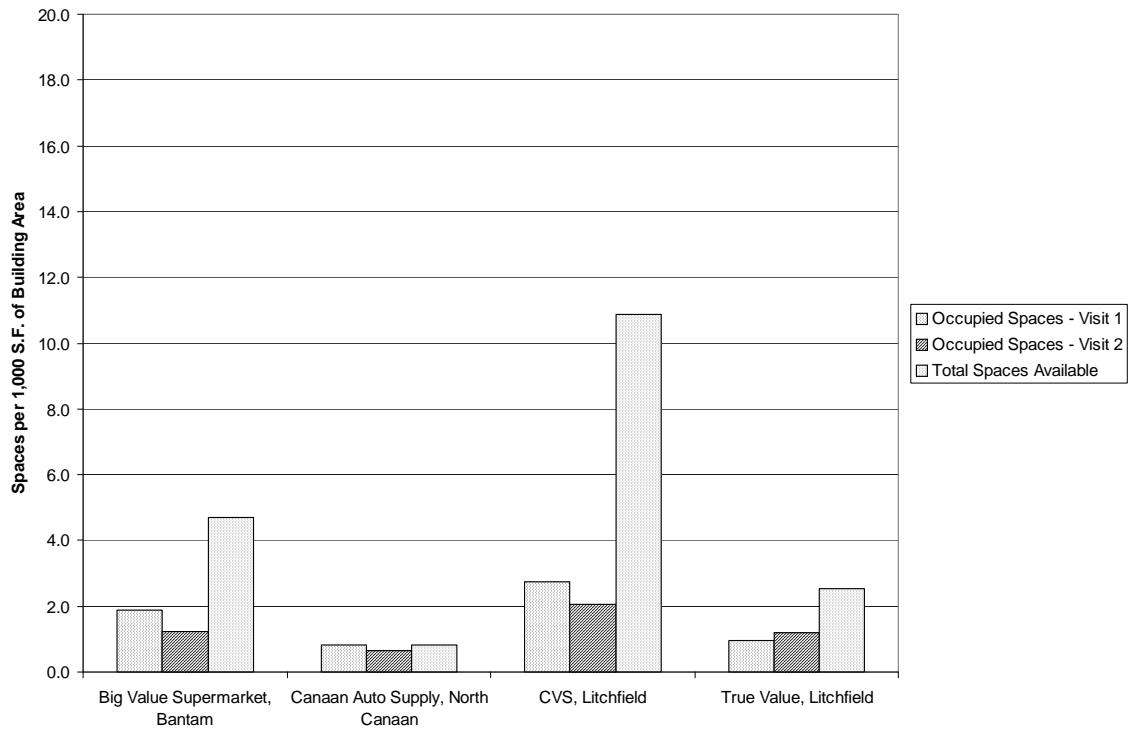


**Figure 2.5**  
**Survey Results for Free-Standing Retail**

**Parking Lot Occupancy (Percent of Regular Spaces Occupied per Visit)**

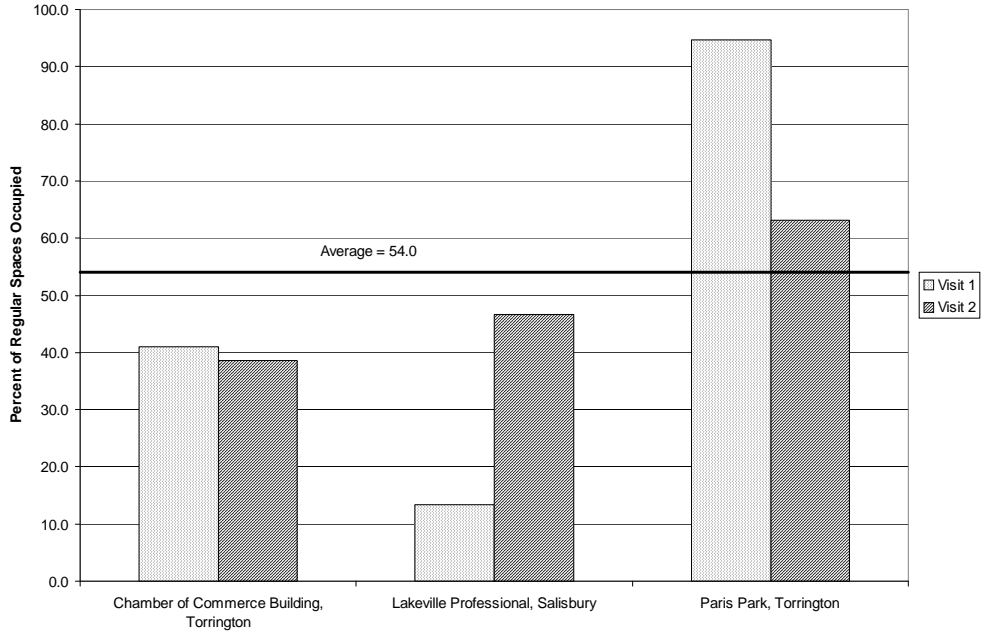


**Ratio of Parking Spaces to Building Size**

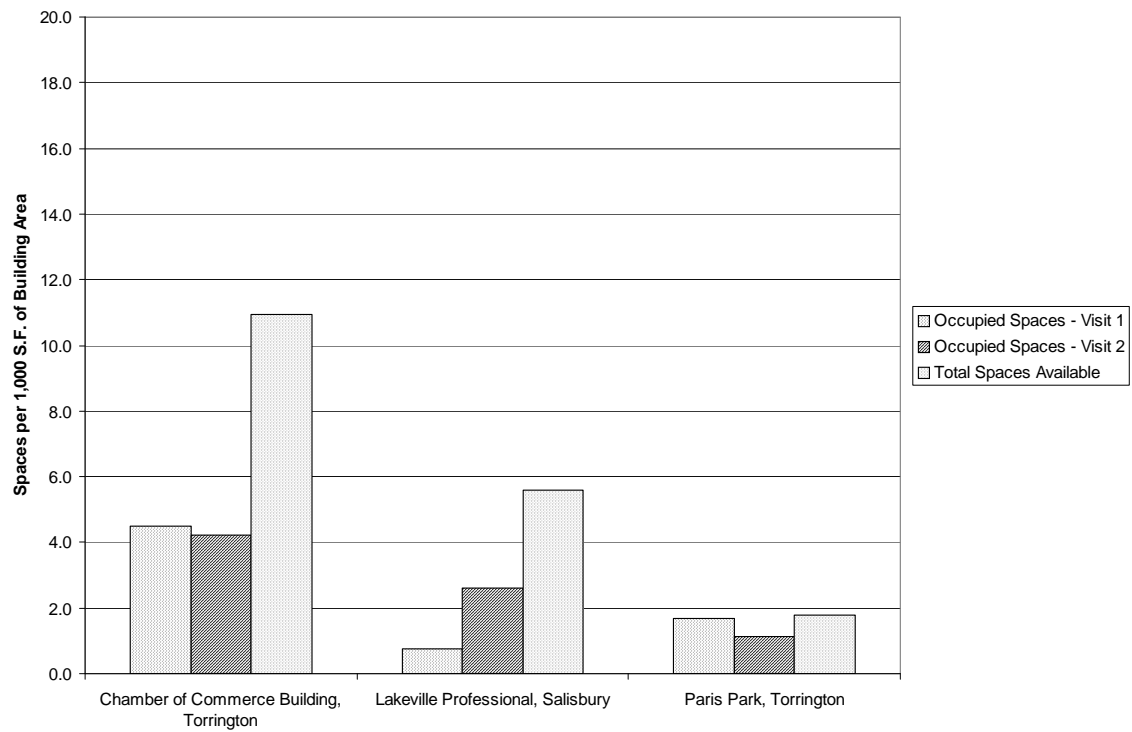


**Figure 2.6**  
**Survey Results for General Office Buildings**

**Parking Lot Occupancy (Percent of Regular Spaces Occupied per Visit)**

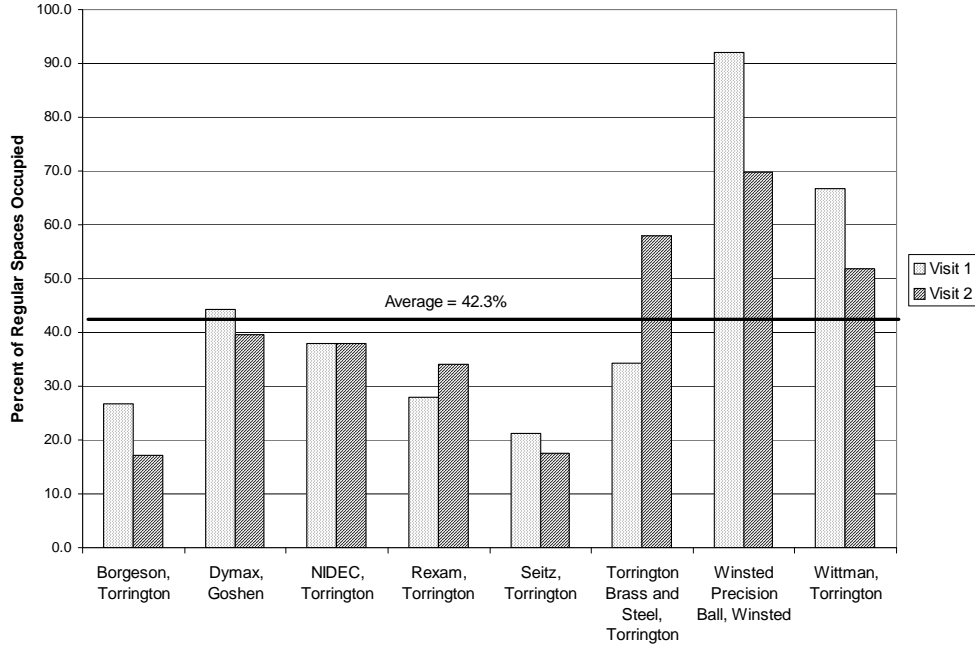


**Ratio of Parking Spaces to Building Size**

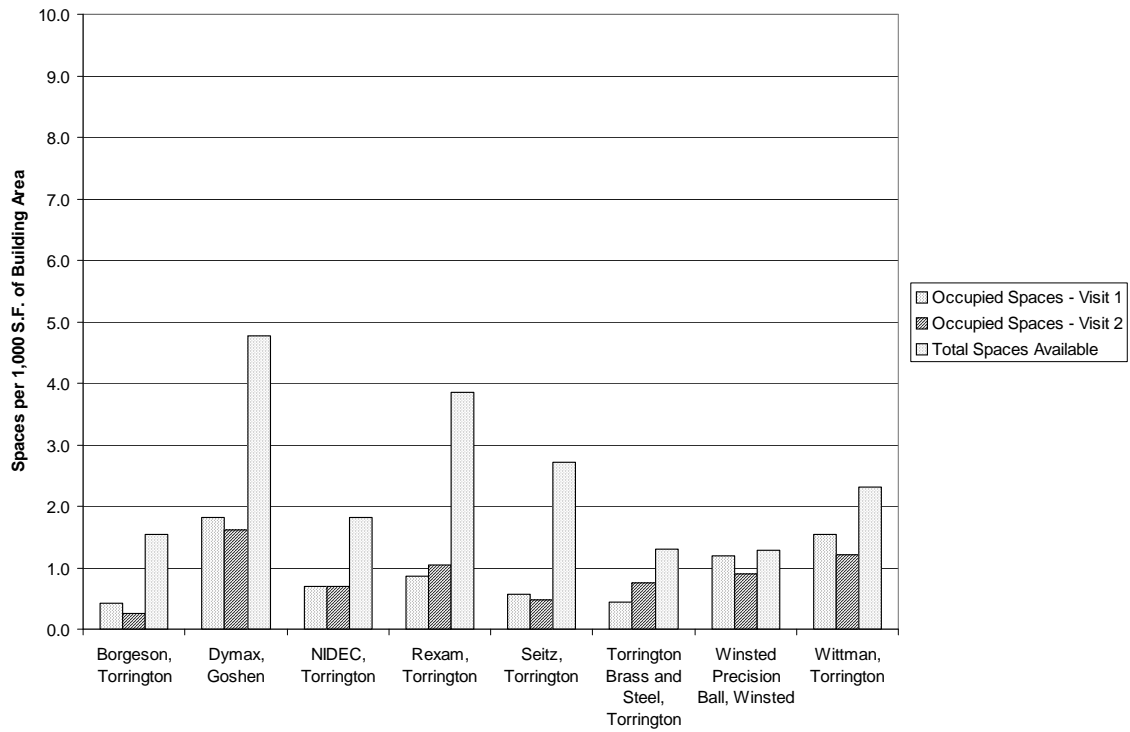


**Figure 2.7**  
**Survey Results for Industrial Plants**

**Parking Lot Occupancy (Percent of Regular Spaces Occupied per Visit)**

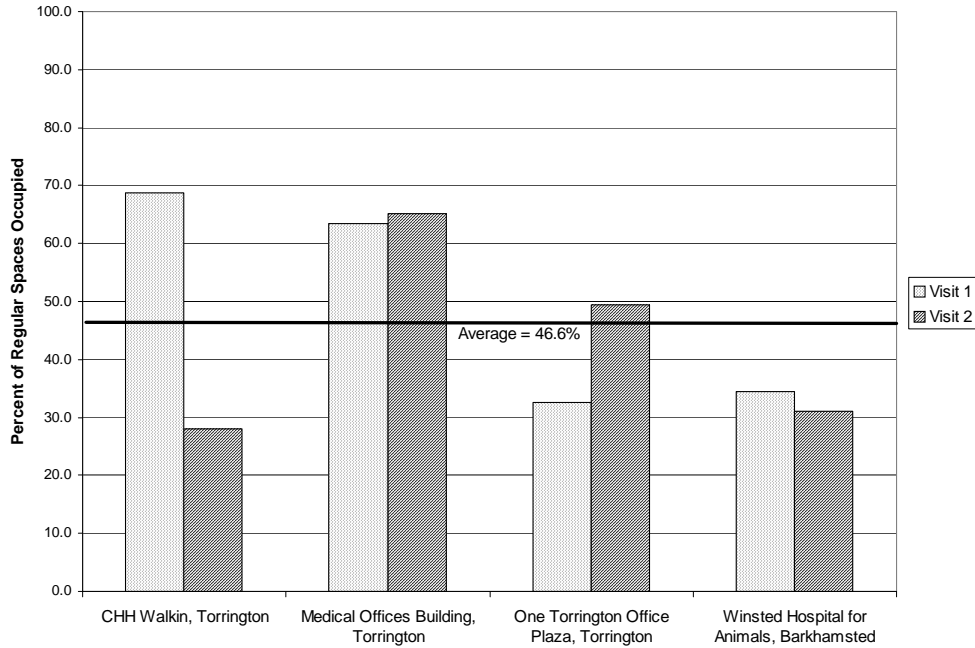


**Ratio of Parking Spaces to Building Size**

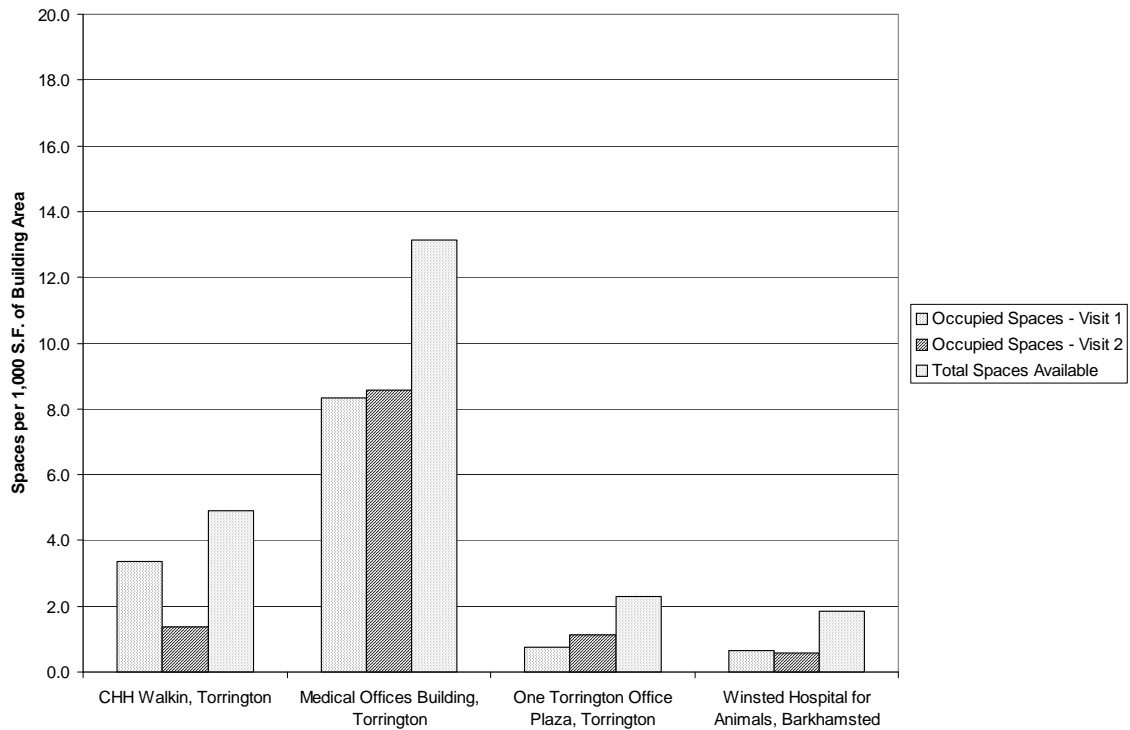


**Figure 2.8**  
**Survey Results for Medical Office Buildings**

**Parking Lot Occupancy (Percent of Regular Spaces Occupied per Visit)**

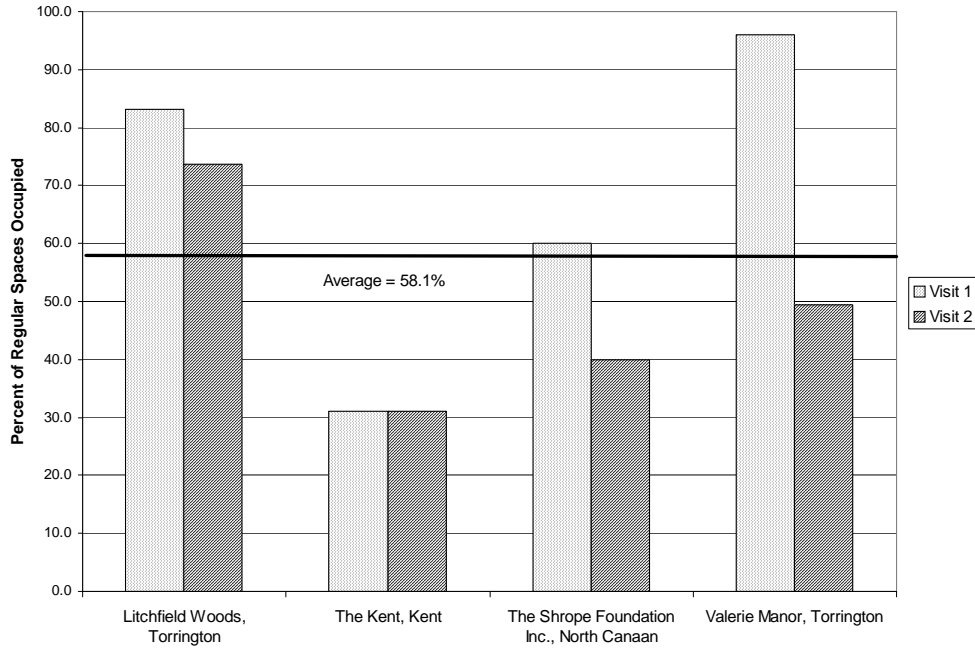


**Ratio of Parking Spaces to Building Size**

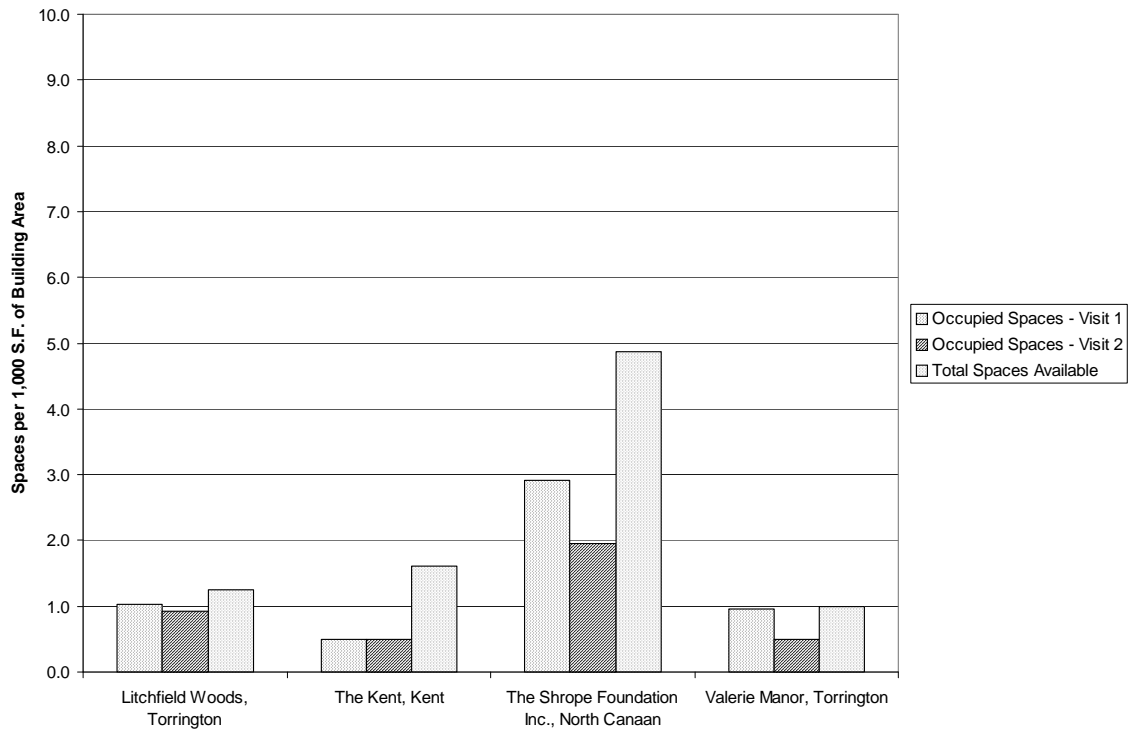


**Figure 2.9**  
**Survey Results for Nursing Homes**

**Parking Lot Occupancy (Percent of Regular Spaces Occupied per Visit)**

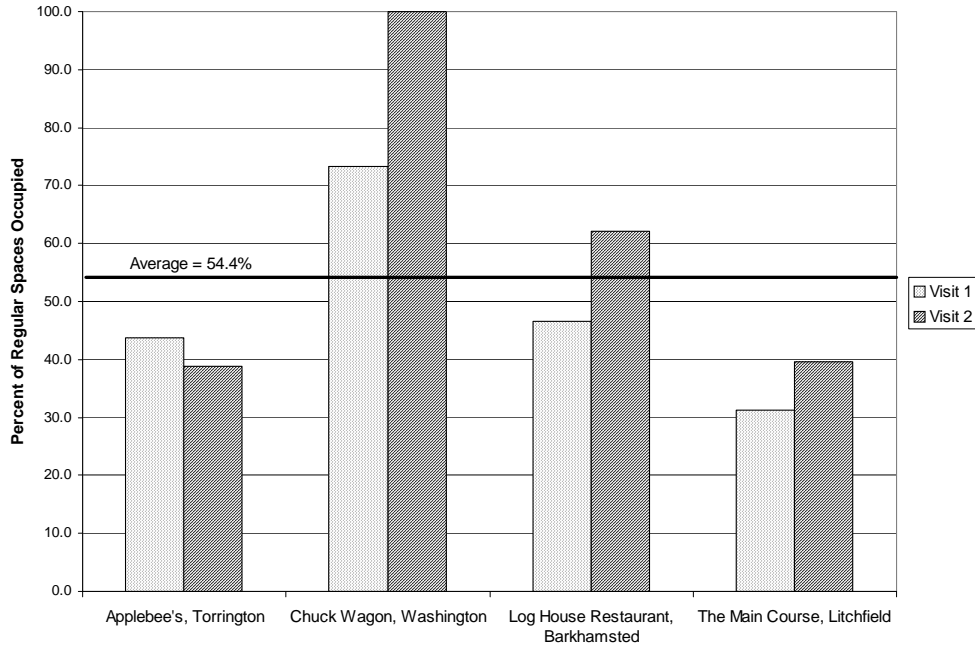


**Ratio of Parking Spaces to Building Size**

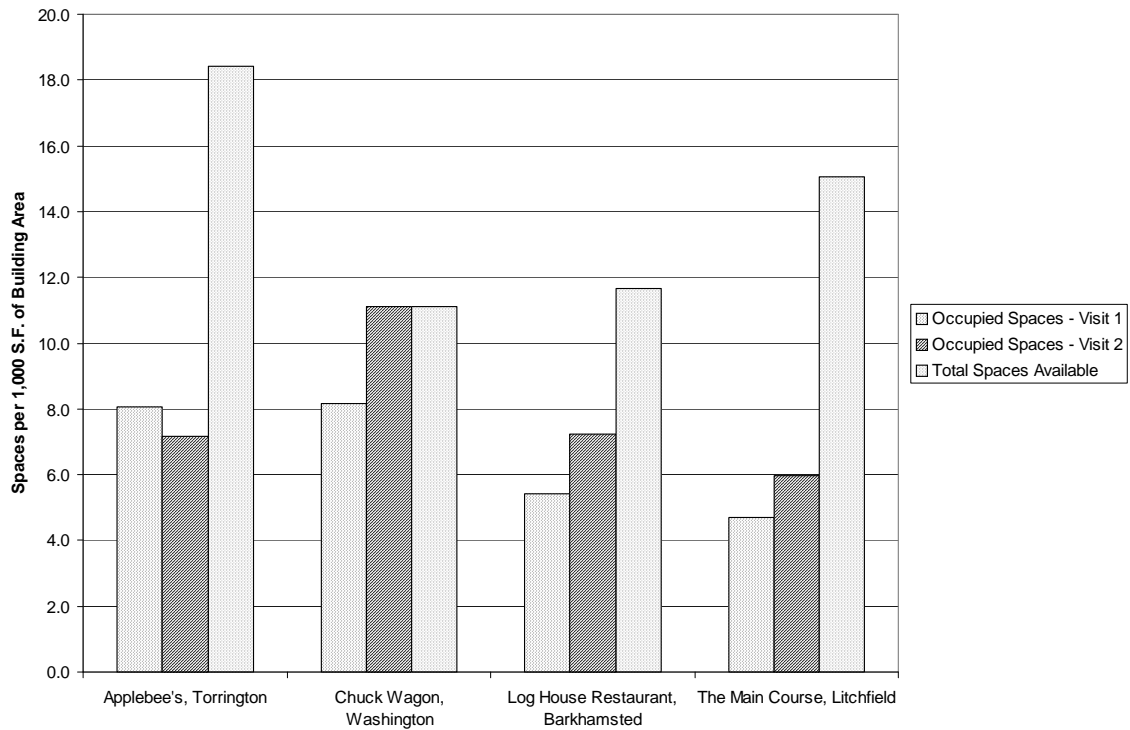


**Figure 2.10**  
**Survey Results for Restaurants**

**Parking Lot Occupancy (Percent of Regular Spaces Occupied per Visit)**

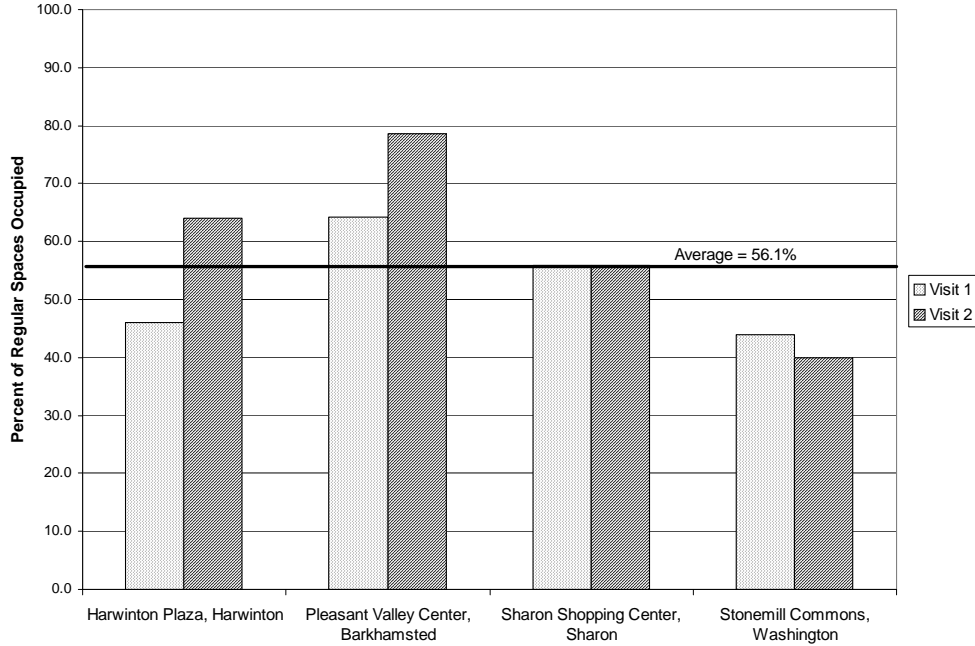


**Ratio of Parking Spaces to Building Size**

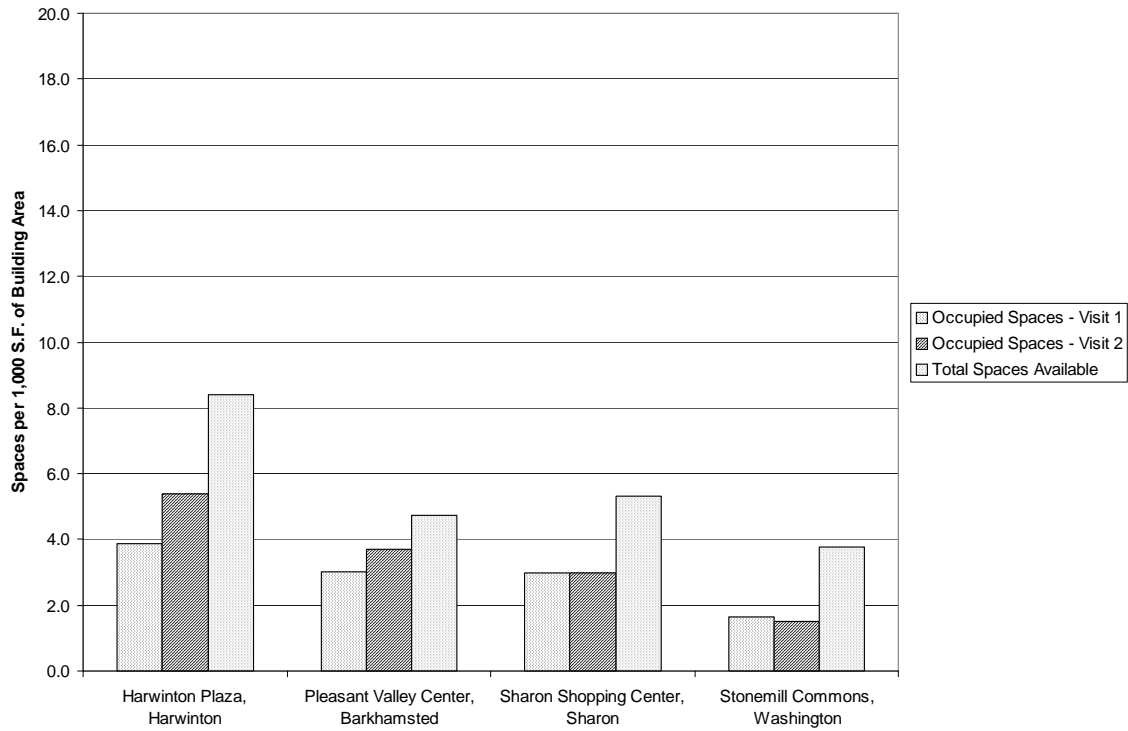


**Figure 2.11**  
**Survey Results for Small Shopping Centers**

**Parking Lot Occupancy (Percent of Regular Spaces Occupied per Visit)**

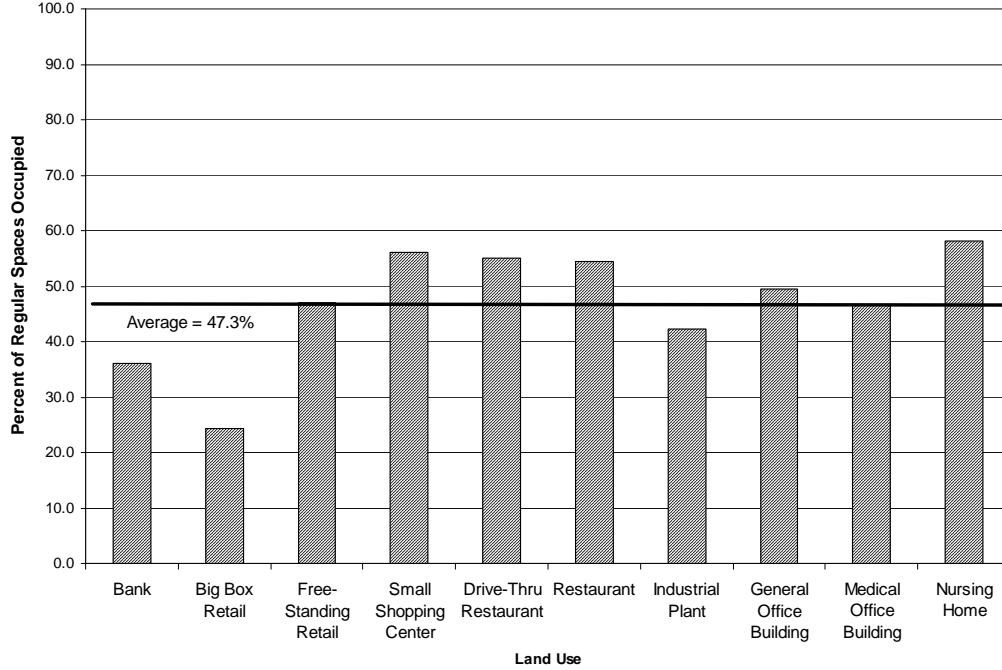


**Ratio of Parking Spaces to Building Size**

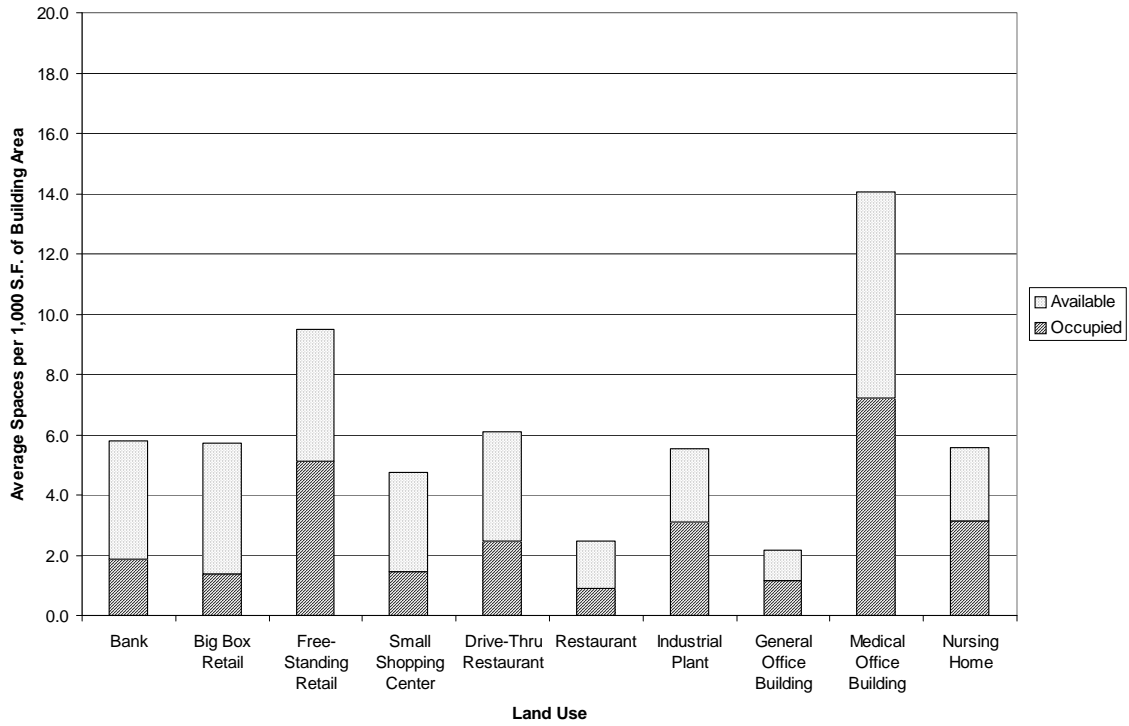


**Figure 2.12**  
**Survey Results for All Land Uses**

**Average Parking Lot Occupancy (Percent of Regular Spaces Occupied per Visit)**



**Average Ratio of Parking Spaces to Building Size**



The number of unoccupied regular parking spaces for the Sovereign Bank observations were 16 and 18.

- The parking lot at the Union Bank was used most heavily of the bank lots surveyed, with 59.1 percent of the regular parking spaces occupied on each visit.
- Union Bank provided approximately 1.5 times\* more parking than was occupied.

### **Big Box Retail Parking Lots**

- A total of two big box retail parking lots were surveyed.
- On average, 24.3 percent of the regular parking spaces were occupied.
- Usage ranged from a low of 13.3percent to a high of 35.7 percent.
- The percentage of occupied spaces was similar for both parking lots.
- The Home Depot provided almost 3 times\* more parking than was occupied.
- The number of unoccupied regular parking spaces for the Home Depot observations were 367 and 495.
- The Stop n Shop provided approximately 3 times\* more parking than was occupied.
- The number of unoccupied regular parking spaces for the Stop n Shop observations were 139 and 110.

### **Drive-Thru Restaurant Parking Lots**

- A total of 4 drive-thru restaurant parking lots were surveyed.
- On average, 55.1 percent of the regular parking spaces were occupied.
- Usage ranged from a low of 25.0 percent to a high of 100 percent.

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\* Calculated by comparing the total number of available parking spaces to the number of occupied parking spaces of the visit with the higher occupancy

- The Wendy's parking lot was unique among this land use with 100 percent of the regular parking spaces occupied. This may be attributed to the fact that Wendy's just recently opened (in the previous few months).
- The KFC provided approximately 3 times\* more parking than was occupied.
- The number of unoccupied regular parking spaces for the McDonalds observations were 48 and 40.

### **Free-Standing Retail Parking Lots**

- A total of four free-standing retail parking lots were surveyed.
- On average, 47.1 percent of the regular parking spaces were occupied.
- Usage ranged from a low of 19.0 percent to a high of 100 percent.
- The Canaan Auto Supply parking lot stands out with a high percentage of occupied regular spaces. This parking lot has an abnormal layout, with a combination of paved and unpaved area that is not clearly delineated for parking. It only has five delineated parking spaces, so a few cars parked in the area clearly established for parking will yield a high percent of occupied spaces.
- CVS provided almost 4 times\* more parking than was occupied.
- The number of unoccupied regular parking spaces for the CVS observations were 59 and 64.

### **General Office Building**

- A total of three general office building parking lots were surveyed
- On average, 54.0 percent of the regular parking spaces were in use.
- Usage ranged from a low of 13.3 percent to a high of 94.7 percent.
- The parking lot for Paris Park was the most heavily used and had 94.7 percent of the regular parking spaces occupied during one of the visits.

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\* Calculated by comparing the total number of available parking spaces to the number of occupied parking spaces of the visit with the higher occupancy

- The occupancy for the Paris Park parking lot was approximately equivalent to the available parking.
- The Chamber of Commerce Building parking lot had 40.9 percent of the regular spaces occupied for one of the visits.
- Approximately 2.5 times\* more parking was provided for the Chamber of Commerce Building than was occupied.
- The number of unoccupied regular parking spaces for the Chamber of Commerce Building observations were 75 and 78.

### **Industrial Plants**

- A total of eight industrial plant parking lots were surveyed.
- On average, 42.3 percent of the regular parking spaces were occupied.
- Usage ranged from a low of 17.1 percent to a high of 92.1 percent.
- The Seitz parking lot was the least occupied of the industrial plant parking lots with only 21.2 percent of the regular spaces occupied.
- Seitz provided approximately 4.5\* times more parking than was occupied.
- The number of unoccupied regular parking spaces for the Seitz observations were 167 and 175.
- The parking lot for Winsted Precision Ball was the most heavily used; 92.1 percent of the regular parking spaces were occupied during one of the visits.
- The occupancy for the Winsted Precision Ball parking lot was approximately equivalent to the available parking.

### **Medical Offices Buildings**

- A total of four medical office building parking lots were surveyed.
- On average, 46.6 percent of the regular parking spaces were occupied.

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\* Calculated by comparing the total number of available parking spaces to the number of occupied parking spaces of the visit with the higher occupancy

- Usage ranged from a low of 28.1 percent to a high of 68.8 percent.
- The CHH Walkin provided almost 1.5 times\* more parking than was occupied.
- The Winsted Hospital for Animals provided approximately 3 times\* more parking than was occupied.
- The number of occupied regular parking spaces for the One Torrington Plaza observations were 56 and 42.

### **Nursing Homes**

- A total of four nursing home parking lots were surveyed.
- On average, 58.1 percent of the regular parking spaces were occupied.
- Usage ranged from a low of 31.1 percent to a high of 96.1 percent.
- The parking lot at The Kent was the least occupied; 31.1 percent of the regular parking spaces were occupied.
- Approximately 3 times\* more parking than was occupied was provided at The Kent.
- The number of occupied regular parking spaces for The Kent observations were both 71.
- Valerie Manor had the most heavily used parking lot; 96.1 percent of the regular parking spaces were occupied for one of the visits.
- The occupancy for the Valerie Manor parking lot was approximately equivalent to the available parking.

### **Restaurants**

- A total of four restaurant parking lots were surveyed.
- On average, 54.4 percent of the regular parking spaces were occupied.

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\* Calculated by comparing the total number of available parking spaces to the number of occupied parking spaces of the visit with the higher occupancy

- Usage ranged from a low of 31.3 percent to a high of 100 percent.
- One of the observations for the Chuck Wagon indicated that the lot was full.
- The Main Course had the least occupied parking lot of the restaurants surveyed; 39.6 percent of the regular parking spaces were occupied for one of the visits.
- The Main Course provided approximately 2.5 times\* more parking than was occupied.
- The number of occupied regular parking spaces for the Applebee's observations were 58 and 63.

### **Small Shopping Centers**

- A total of four small shopping center parking lots were surveyed.
- On average, 56.1 percent of the regular parking spaces were occupied.
- Usage ranged from a low of 40.0 percent to a high of 78.6 percent.
- The Stonemill Commons parking was the least occupied; 44.0 percent of the regular parking spaces were occupied.
- Approximately 2 times\* more parking was provided at the Stonemill Commons than was occupied.
- The Pleasant Valley Center parking lot was the most heavily occupied; 78.6 percent of the regular parking spaces were occupied.
- The Pleasant Valley Center provided 1.3 times\* more parking than was occupied.
- The number of occupied regular parking spaces for the Sharon Shopping Center observations were both 49.

### **Comparison Among Land Use Categories**

- The amount of parking at nursing homes most closely matched the occupancy rates of all the land uses studied. These parking lots were consistently more fully

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\* Calculated by comparing the total number of available parking spaces to the number of occupied parking spaces of the visit with the higher occupancy

used than lots at other land uses, at an average of 58.1 percent occupied (regular parking spaces).

- The excess parking provided at big box retail locations is greater than for any other land use because of the size of the parking lots. The Big box lots surveyed were, on average, only 24.3 percent occupied when surveyed.
- Generally more parking is provided than is occupied.
- Nursing homes provided the least parking in relation to building size.
- Industrial plants are typically large buildings with a set number of people coming and going with each shift. The number of people parking and using the building is relatively low in relation to building size as compared with a land use such as a restaurant. This use, therefore, had the lowest average occupied regular spaces in relation to building size.
- Looking only at the higher occupancy rate for each parking lot, and assuming 9' X 18' parking spaces, the unoccupied parking area for all of the lots surveyed is approximately 278,800 S.F. or about 6.4 acres. This does not include the area for the drive aisle.

It should be noted that there were some differences in the occupancy of regular spaces between the two survey visits for some of the parking lots. Table 2.4 shows these differences for locations where the occupancy differed by 20 percent or more between visits.

**Table 2.4**  
**Occupancy Differences of 20 Percent or More Between Visits**

<b>Business Name</b>	<b>Number of Regular Spaces Available</b>	<b>Percent Occupied Regular Spaces for Visit 1</b>	<b>Percent Occupied Regular Spaces for Visit 2</b>	<b>Difference</b>
Torrington Savings Bank	10	20.0	40.0	20.0
Home Depot	571	35.7	13.3	22.4
Canaan Auto Supply	5	100.0	80.0	20.0
Paris Park	19	94.7	63.2	31.6
Torrington Brass and Steel	76	34.2	57.9	23.7
Winsted Precision Ball	63	92.1	69.8	22.2
CHH Walkin	32	68.8	28.1	40.6
Shrope Foundation, Inc.	15	60.0	40.0	20.0
Valerie Manor	77	96.1	49.4	46.8
Chuck Wagon	30	73.3	100.0	26.7

Source: Fitzgerald & Halliday, Inc., February 2002

The following may have been factors in these results:

- The Torrington Savings Bank, Canaan Auto Supply, and Shrope Foundation had parking lots with capacities of 10, 5, and 15 vehicles, respectively. Since the parking lots are so small, a difference of only 2 or 3 parked vehicles makes a large difference in the percent of occupied spaces.
- The difference in observed occupancy at the Home Depot is likely that the greater observation was made on a Saturday (when more shopping takes place) and the lower observation was made on a Monday afternoon. The Monday afternoon observation is not during the expected peak usage time.
- For the Paris Park office building, the higher occupancy was observed at almost 2:00 PM, while the lower occupancy was observed at about 12:30 PM when many people may be out getting lunch.
- The two observations for the Winsted Precision Ball were made on different days of the week. The higher occupancy was observed on a Thursday and the lower was observed on a Friday. Some manufacturing jobs have rotating weekly schedules, and it's possible that fewer employees are scheduled to work on Fridays than on Thursdays.
- The higher occupancy for CHH Walkin medical office building was observed at 10:45 AM and the lower occupancy was observed at 12:45 PM when many people might be out getting lunch.
- The lower occupancy for Valerie Manor was observed between 3:15 and 3:30 PM. The shift change for nursing homes is often around 3:00 PM, so this visit may have been after the shift change.
- Even during the perceived peak usage period, there can still be some variation in the occupancy of parking lots.

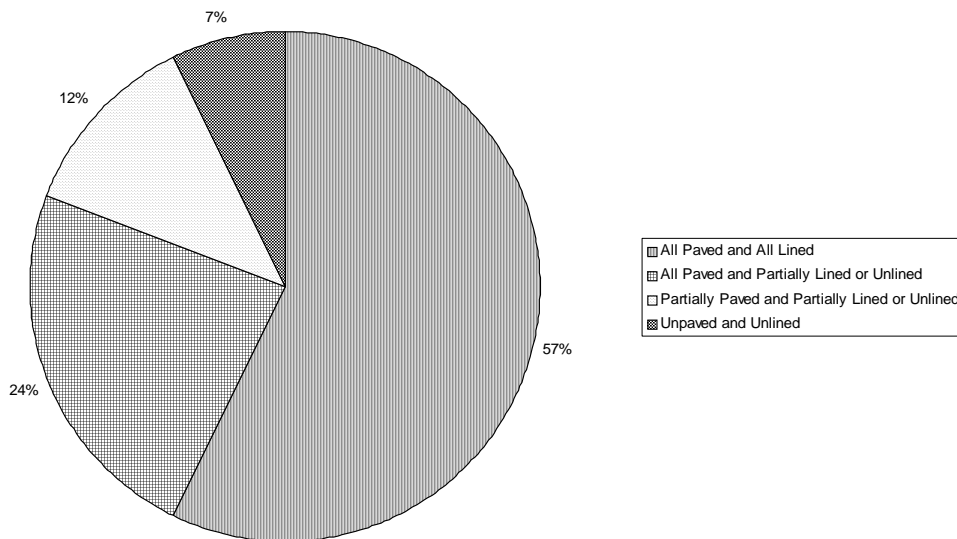
It is important to note that the parking lot sizes within each land use category varied. The ramifications of low occupancy rates for larger lots are much greater in terms of impervious surface area than for small lots. For example a parking lot of 12 spaces that has 25 percent occupancy has much less unoccupied area than a parking lot of 100 spaces with 25 percent occupancy. Considering the typical dimension of a parking space is 9' X 18', each parking space occupies 162 square feet of asphalt, and there is additional area required for driving area. The unused asphalt area for a 12 space parking lot that is 25 percent occupied is approximately 1,460 square feet while that of a 100 space parking lot that is 25 percent occupied is approximately 12,150 square feet.

In addition to examining the occupancy of the parking lots, other observations were made about the parking lots, such as the type of parking lot. The parking lots were classified as all paved and all lined, all paved and partially lined, partially paved and partially lined,

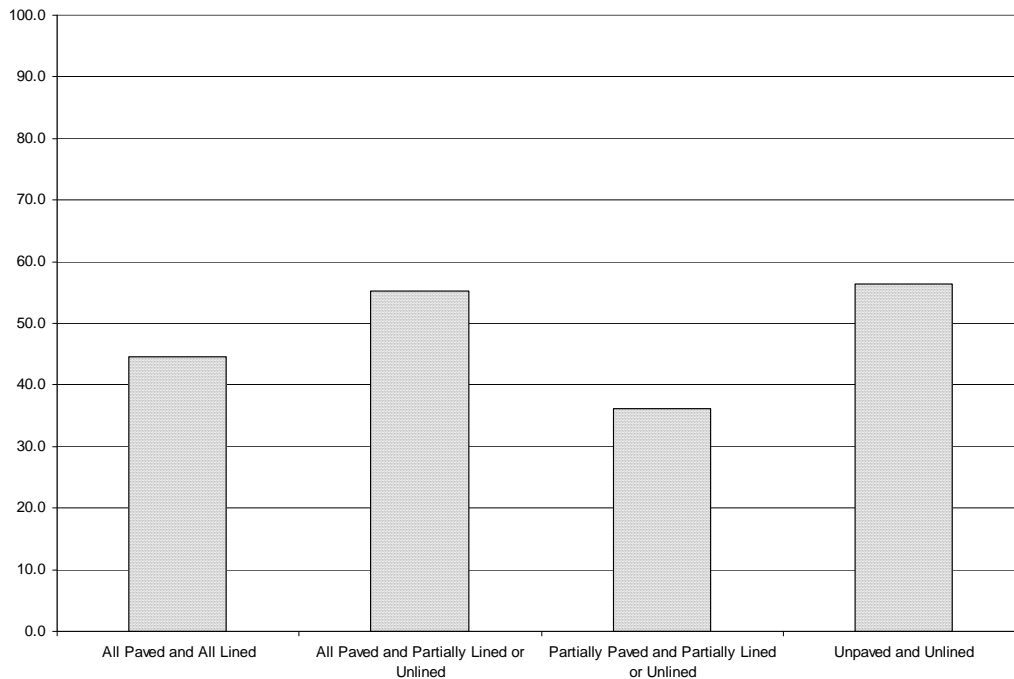
and unpaved and unlined. Figure 2.13 shows the percentage of surveyed lots in each category. It was expected that there could be differences in the occupancy of unlined versus lined parking lots and paved versus unpaved because of confusion of where to park in lots with no lines delineating the spaces.

The average percent of occupied regular spaces for each lot type are shown in Figure 2.14. This comparison shows that while there are some differences in the average percent of occupied regular spaces for each lot type, the differences are relatively small. The partially paved and partially lined or unlined parking lots tended to have the lowest occupancy, which might be attributed to some confusion of where to park when the lot has multiple surface types. Overall, the average percent of occupied regular spaces for all of the lots was 47.3.

**Figure 2.13**  
**Percentage of Parking Lot Types**



**Figure 2.14**  
**Average Percent of Occupied Regular Spaces for Each Lot Type**



The presence of landscaping, lighting, and drainage were also determined, as shown in Table 2.5. Approximately  $\frac{3}{4}$  of the lots surveyed had some form of landscaping which included any combination of perimeter landscaping, interior landscaping, vegetated islands, and trees. The vegetation from these landscaping treatments reduces the quantity of storm water runoff, provides filtration, and improves water quality. Slightly more than half of the parking lots had either drainage structures or grassy swales.

**Table 2.5**  
**Percentage of Surveyed Parking Lots Containing Landscaping, Lighting, and Drainage Features**

<b>Parking Lot Feature</b>	<b>Percent of Lots</b>
Landscaping	76.2
Perimeter Landscaping	41.7
Interior Landscaping	17.9
Vegetated Islands	36.9
Trees	39.3
Lighting	56.0
Drainage Structures or Grassy Swales	51.9

Source: Fitzgerald & Halliday, Inc., February 2002

Table 2.6 shows the average number of vehicles arriving at and departing from the parking lots in each land use category. This estimates the turnover for each land use.

The big box retail parking lots had the highest turnover. Industrial Plants had the lowest turnover.

**Table 2.6**  
**Average Number of Vehicles Arriving and Departing During 10 Minute Period**  
**By Land Use Category**

<b>Land Use Category</b>	<b>Average Number of Vehicles Arriving</b>	<b>Average Number of Vehicles Departing</b>
Bank	5	3
Big Box Retail	25	21
Free-Standing Retail	10	8
Small Shopping Center	9	10
Drive-Thru Restaurant	15	13
Restaurant	4	4
Industrial Plant	1	1
General Office Building	3	2
Medical Office Building	3	2
Nursing Home	3	4

Source: Fitzgerald & Halliday, Inc., February 2002

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### 3. ZONING COMPARISON

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One of the primary questions examined by this study is whether the amount of parking required in local zoning regulations results in the construction of more parking area than is necessary to serve a particular land use. In order to answer that question, the survey data collected was compared to zoning requirements in each of the associated towns. The number of spaces required by zoning was compared to the actual number of spaces at each survey location. In addition, the spaces required by zoning were compared to the percentage of occupied spaces observed.

Generally, municipal zoning regulations include parking space requirements for each type of land use, regardless of the zone where they occur. Typically, the required number of spaces is determined based on the square footage of building space. Parking requirements for some businesses, however, such as nursing homes and drive-through restaurants are often based on other factors such as the number of employees, number of patient beds, amount of patron seating, or number of drive-through windows.

It is standard practice to correlate the number of required spaces to the activity rather than to the zoning district where the use occurs or to the traffic volumes on adjacent streets. Yet, there does not appear to be a consistent methodology for relating parking requirements to land use among the towns surveyed. Although this standard approach seems logical, it also means that in the course of the development approval process, the need for space in each parking lot is considered independently of other parking in the vicinity. Consequently, the cumulative area of parking in any one area of a community is likely to grow larger and larger without consideration for the efficiencies of shared parking and dual-purpose trips. Furthermore, larger parking lots generally result in building being further set back from the street. The result is vehicle-oriented development rather than pedestrian-oriented development as walking to and from several businesses is more difficult as a result of the greater distance between businesses and the unpleasantness of walking through parking lots.

Table 3.1 provides a sample of the results of the zoning comparison. More detailed tabular data regarding parking requirements compared to actual number of spaces, and number of observed occupied spaces are provided in Appendix D.

The comparison of zoning requirements to existing parking shows that many of the parking lots had more spaces than was required by zoning. However, a few of the parking lots actually had fewer spaces than was required by zoning, such as One Torrington Office Plaza, Big Value Supermarket, and Sharon Shopping Center. Still, in these cases, the parking lot was only partially occupied when surveyed. These results indicate that the number of parking spaces required by zoning is probably higher than necessary for most, if not all, land uses. In some cases, the required parking may be as much as three or four times the average need, as indicated by this study's parking survey results.

**Table 3.1**  
**Sample\* Comparison of Zoning Requirements to Existing Parking**

<b>Town/ Business Name</b>	<b>Type of Use</b>	<b>Existing Spaces per 1000 S.F. of Building Area</b>	<b>Required Spaces per 1000 S.F. of Building Area</b>	<b>Number of Occupied Spaces per 1000 S.F.** of Building Area</b>
Torrington/ Sovereign Bank	Bank	9.7	3.5	2.3
Canaan/ Torrington Savings Bank	Bank	4.9	5 plus 5 per drive-up window	1.9
North Canaan/ Stop n Shop	Big-Box retail	6.5	5 plus 1 per 2 employees	2.1
New Hartford/ Home Depot	Big Box retail	4.9	4	1.7
Salisbury/ Lakeville Professional	General Offices	5.6	5	2.6
Torrington/ Chamber of Commerce	General Offices	11.0	3	4.5
Winsted/ Winsted Precision Ball	Industrial	1.3	1 per employee	1.2
Torrington/ Seitz	Industrial	2.7	1.7	0.6
Torrington/ CHH Walkin	Medical offices	4.9	4	3.4
Torrington/ One Torrington Office Plaza	Medical offices	2.3	4	1.1
Torrington/ Litchfield Woods	Nursing Home	1.2	1 per 3 beds	1.0
Kent/ The Kent	Nursing Home	1.6	1 per 3 beds	0.5
Litchfield/ CVS	Retail	10.9	8	2.8
Bantam/ Big Value Supermarket	Retail	4.7	10	1.9
New Hartford/ Log House Restaurant	Restaurant	11.7	2	7.2
Washington/ Chuck Wagon	Restaurant	11.1	1 per employee plus 1 per 5 patron seats	11.1
North Canaan/ McDonalds	Drive-thru Restaurant	16.4	1 per 2 employees plus 1 per 5 patron seats	6.1
Torrington/ Wendy's	Drive-thru Restaurant	12.1	10 plus 6 per drive- thru window	12.1
Harwinton/ Harwinton Plaza	Shopping Center	8.4	6.5	5.4
Sharon/ Sharon Shopping Center	Shopping Center	5.6	7	3.0

Source: Fitzgerald & Halliday, Inc., February 2002

\* Sample consists of two parking lots from each land use category

\*\* Higher value of the two observations made

A review of national parking standards was also performed for this study to help to gauge where Northwest Connecticut fits into a national perspective. Specifically, since the zoning regulations in Northwest Connecticut were found in many case to require parking above what may be needed, we wanted to determine whether local zoning regulations are exceeding national standards or are similar.

In 1991, the American Planning Association published *Off-Street Parking Requirements*, which is a review of parking standards from 127 zoning ordinances across the United States. This publication was intended to be an informational guide and is not intended to provide the exact number of parking spaces for each land use in each community since each community is different. Table 3.2 provides the ranges of national standards for land uses surveyed in this study, with the exception of Big Box Retail, which was not included as a separate category in the national standards.

**Table 3.2**  
**National Parking Standards**

<b>Land Use Category</b>	<b>Range for Spaces Required per 1,000 S.F. of Building Area</b>
Bank	4 – 10
Convalescent Center or Nursing Home	1 – 1.7
Manufacturing/Industrial	1.5 – 2.5
General Office	1.3 – 5
Medical Office	3.3 – 20
Restaurant	6.7 – 14
Fast-Food Restaurant	10 – 40
Retail Store	1 – 5.5
Shopping Center	5 – 10

Source: *Off-Street Parking Requirements*, American Planning Association, 1991

The review conducted by the American Planning Association indicates that there is a great deal of fluctuation in parking requirements nationwide. Zoning requirements for parking in the towns surveyed in northwestern Connecticut also range quite a bit from town to town, but tend to be on the lower end of the national range. National standards do not, therefore, appear to offer a reasonable framework for alternative zoning requirements.

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## **4. PARKING REDUCTION STRATEGIES**

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The parking survey results indicate that, in general, parking lots in Northwest Connecticut are underutilized and that zoning requirements are resulting in the construction of more parking area than is needed and sometimes more than required by zoning. As a result, research was performed to determine the appropriate goals for parking lot occupancy (e.g., how full the parking lots should be) as well as some appropriate strategies to reduce the amount of impervious parking area in the region. This information was collected through a general literature search and is intended to present an overview of parking reduction strategies. The research was not intended to comprehensively cover each strategy, but to provide a starting point from which more specific techniques tailored to each community can be developed.

### **PARKING OCCUPANCY GOALS**

It is important to provide enough parking so that parking lots are not often 100 percent occupied; however, the average percentage of occupied parking spaces in this survey was 47.3, which is much lower than desirable. Generally, the target percentage of occupied parking spaces is between 85 and 95 percent (Papacostas et al. 1993). That is, a business will want to have enough parking such that the lot is about 85 percent occupied during typical peak periods. This allows for fluctuations in business activity and for turnover in use of spaces during business hours. It has been found that levels of utilization higher than 95 percent are hard to attain due to efficiency losses in turnover and circulation (Papacostas et al. 1993).

### **4.2. STRATEGIES TO REDUCE IMPERVIOUS PARKING AREA**

Strategies to reduce the amount of impervious parking area were investigated. Some strategies include amending parking standards in local regulations, creating shared parking, constructing parking areas of pervious materials, and enhancing access via transit or bicycle and pedestrian paths to offset parking needs. The research focuses primarily on these strategies since these were deemed most appropriate for Northwest Connecticut.

The results of this research effort are presented below. As noted earlier, the research was not intended to comprehensively cover each strategy, but to provide a starting point from which more specific techniques tailored to each community can be developed.

## **Amending Parking Standards**

### ***What are parking standards?***

The primary mechanism that communities in the study area have for guiding the future development of parking lots is through local land use regulations. These regulations commonly set standards for the number, size, and arrangement of parking spaces required for each land use. The parking survey indicated that there is need for parking demand to be more accurately quantified if parking standards in zoning regulations are to provide for an amount of parking truly appropriate to a specific land use. These standards can also be crafted to require developers to minimize, to the extent possible, the area of impervious surface dedicated to parking.

Opportunities to limit the amount of new impervious parking area in each community will arise when new development proposals are approved through the local planning and zoning process. Opportunities to reduce the existing area of impervious parking may occur when existing businesses apply for zoning approval for an expansion or change in use. Consequently, the parking standards within each municipality can be used to influence the amount of impervious parking area over time. Parking standards could include:

- Setting maximum as well as minimum requirements for number of parking spaces
- Setting maximum area of impervious versus pervious parking area
- Requirements that post-development site stormwater discharge does not exceed pre-development site stormwater discharge
- Requirements for drainage structures, including those made of natural materials versus man-made materials
- Requirements for design of landscaping to minimize water runoff

### ***Applicability in Northwest Connecticut***

It is standard practice for municipal zoning to include controls on the location, design, and area of parking associated with development. Every community in the study area has the option to modify their regulations to achieve the goal of reducing impervious parking area to protect water quality from surface water runoff. Therefore, setting appropriate parking standards is a direct technique fully applicable to northwest Connecticut.

### ***Advantages***

The advantages to northwest Connecticut communities to using parking standards to limit impervious surfaces include:

- More desirable parking lot design can be achieved each time a new development proposal comes before the planning and/or zoning commission
- Standards for parking lot design can be clearly spelled out in the regulations, making clear what is expected when development occurs
- This strategy may be relatively easy to implement, as existing zoning provisions may be readily modified to meet these goals
- This strategy does not require significant cost to the community to implement

### ***Issues***

Northwest Connecticut is generally rural and the pace of new development is slow. The predominant form of development in recent years has been single-family residential. Parking standards are not usually applied to parking for single-family homes. It is likely that it would take a number of years for this approach to show measurable results in terms of storm water runoff and water quality improvement.

In addition, parking standards have been applied with the primary goal of ensuring that there are enough spaces to meet demand and that parking is safe and convenient for patrons. Water quality as an issue is not reflected in the parking regulations reviewed. Therefore, the use of parking regulations to achieve water quality goals may require an educational process for a new or different understanding of parking issues on the part of local zoning commissions.

### **Shared Parking**

#### ***What is Shared Parking?***

The concept of shared parking is that two or more land uses that are controlled by one or more owners can use the same parking area over the course of a day. In many cases, parking may be shared because the land uses operate at totally different times. In other cases, the land uses operate at the same times, but the peak usages are at different times. Examples of land uses that could share parking include:

- Residential and daytime employment uses
- Nighttime entertainment and daytime employment uses
- Weekend facilities (e.g. churches) and weekday employment uses or restaurant open only during evenings

In some cases, a single parking space may be shared by patrons of two or more adjacent land uses. A patron may park once and use two or more land uses in a short time period. A common example is a shopping center.

### ***Applicability to Northwest Connecticut***

Shared parking as a strategy for reducing parking area has been mostly implemented in urban areas where the cost of parking is an issue. Some of the most progressive cities in promoting and regulating shared parking are Los Angeles, California; San Diego, California; Portland, Oregon; and Rockville, Maryland. Even though shared parking has been primarily implemented in urban areas, the strategy may be applicable to suburban and rural areas as well. For example, in rural areas, parking is currently shared in many downtown areas through use of municipal parking lots, as well as in shopping centers through the use of one parking lot used by multiple businesses.

### ***Advantages***

Some advantages of shared parking include:

- Encourages more efficient parking
- Attracts mixed-use projects promoting round-the-clock uses and a more secure environment
- Requires less land area for parking, reducing potential area of paved surface and leaving more land available for tax revenue generating uses and/or land conservation
- In some cases, reduces the number of access points for traffic, which improves circulation
- In some cases, reduces trips since patrons can park once and run multiple errands
- Improves aesthetic quality of landscape since less parking area is needed

### ***Issues***

Some of the issues with shared parking include the possibility of shortages of parking if land uses change and the possibility of longer walking distances from a parking lot to a store/facility. In addition, there are issues with multiple property owners. If there are multiple property owners sharing the same parking, agreements need to be made regarding maintenance and liability problems. Furthermore, legal issues could arise when there are changes in ownership.

In rural areas such as Northwest Connecticut, many of the issues mentioned above would not limit the usefulness of this strategy. In the case of downtowns, the legal issues with the municipal parking lots are handled by the town. With many shopping centers in rural areas, only one owner is involved and store space is leased rather than owned by the business owners. With careful planning, legal arrangements, and changes in zoning regulations, shared parking may be applicable for compatible land uses within Northwest Connecticut. In addition, cross-easements may be used as a tool to achieve parking.

## **Parking Areas of Pervious Materials**

### ***What are Pervious Materials?***

Unlike impervious materials, which do not allow water to pass through them, pervious materials allow water to pass through them and can significantly reduce the amount of stormwater runoff. Pervious materials can be used for overflow as well as primary parking areas, and portions of any parking lot could be required to be constructed of pervious materials. For primary parking areas, pervious materials can be used in the entire parking lot, or in areas of the parking lot. For example, the driveway and lanes may still be asphalt paved, but the parking stalls may be constructed of a pervious material. Parking lots constructed of pervious materials can significantly reduce effects of storm water runoff and eliminate the need for drainage systems. Examples of pervious materials include grid pavers, block pavers, and porous pavement which are discussed in more detail below.

### **Grid Pavers**

Grid pavers are constructed primarily from recycled plastic materials that provide load bearing strength, which protect vegetation root systems, with highly porous surfaces such as grass or gravel. These systems are flexible, which allows them to be used on uneven sites. Grid pavers are environmentally friendly because they are constructed of recycled plastic, reduce storm water runoff, help prevent flooding, reduce non-point source pollution, reduce imperviousness of the area, and minimize site disturbance. Figure 4.1 shows examples of parking lots where grid pavers have been used with both grass and gravel. One of the photographs is of an overflow parking area at the Westfarms Mall in Connecticut.

### **Block Pavers**

Block pavers are constructed of concrete and the layout results in 20 to 50 percent more open surface than impervious pavements. The type of sub-grade and filler determines the perviousness of block paver systems. Block pavers add aesthetic value. Figure 4.2 shows examples of block pavers.

### **Porous Pavement**

Porous pavement is the same as asphalt except that porous pavement does not contain fine particles and is not sealed to be waterproof. With porous pavement, the runoff rate is substantially reduced from impervious surfaces, erosion can be better controlled, water quality can be enhanced, and storm sewer installations can be avoided. In addition, natural vegetation and drainage patterns can be retained and groundwater recharge may be possible. There are also porous concrete pavements for which freeze/thaw studies have been performed and demonstrate that it is a viable option in colder climates (Tarmac America 2002). Figure 4.3 shows the cross-section of pervious concrete with water dripping through.

**Figure 4.1**  
**Parking Lots Constructed With Grid Pavers**



Grid Pavers with grass surface  
Westfarms Mall, Connecticut



Grid pavers with grass surface  
First Presbyterian Church, Washington



Grid pavers with gravel surface  
Dominican University, Illinois



Grid pavers with gravel surface  
Vail Lutheran Church, Colorado

Source: Invisible Structures, Inc., 2002

**Figure 4.2**  
**Examples of Block Pavers**



Eco-stone



Eco-stone



Turfstone

Source: Unilock, 1999

**Figure 4.3**  
**Cross-Section of Pervious Concrete**



Source: Tarmac America, 2002

### ***Applicability to Region***

The use of pervious materials in parking areas is appropriate for many applications in Northwest Connecticut. Grid pavers, block pavers, porous pavement, and gravel could be used in constructing both primary and overflow parking areas. Grid pavers and block pavers could increase aesthetics in parking areas within the region. These alternatives to impervious parking surfaces are especially appropriate for implementation in overflow parking areas. Parking lots constructed of some pervious materials might be more applicable to some land uses than other, such as uses that have a part-time need for larger parking areas. These uses include churches, private/boarding schools, colleges, banquet facilities, tourist destinations, and seasonal businesses.

### ***Issues***

Parking lots constructed of pervious parking materials require some additional maintenance efforts. For example, when plowing these parking lots, additional care must be taken not to lower the blade to the parking surface. Grid pavers constructed with a grass surface can be plowed using rollers beneath the blades to reduce the likelihood of damage from plows. In addition, depending on the type of grass used with grid pavers, mowing and watering may be needed.

### ***Costs***

Costs of parking areas constructed on pervious materials are dependent on specifics of each site. In general, installation of these materials is higher than that of asphalt paving. Invisible Structures, Inc., a manufacturer of grid pavers, indicates that installations are 10 to 15 percent more costly than asphalt. In most cases, however, grid pavers can eliminate the need for storm water drainage or collection systems and require minimal maintenance over 15 to 20 years, which can produce a savings of up to 40 percent over traditional asphalt paving (Invisible Structures, Inc. 2002). The costs of porous pavement are approximately the same as conventional asphalt paving with storm water management systems (Cahill Associates 2002). These costs would be borne by developers.

## **Enhance Access Via Bicycle and Pedestrian Paths**

### ***Applicability to Region***

Many of the businesses located in Northwest Connecticut are located within or near village areas. Village centers tend to have denser development making walking and bicycling viable options for visiting multiple businesses within the centers. Some village centers lack complete sidewalk networks and increased pedestrian and bicycle access via paths could supplement the need for additional parking in these areas.

### ***Advantages***

Some of the advantages of constructing bicycle and pedestrian paths in village centers include:

- Enhances village centers by reducing vehicle trips
- Makes village centers more walkable for residents and tourists
- Increases attractiveness of bicycling for both recreational and in-town bicyclists

*Issues*

Since development areas outside village centers of Northwest Connecticut is not very dense, it is unlikely that residents in the region will be able to or interested in accessing larger developments by bicycle or pedestrian paths. In addition, development of pedestrian and bicycle paths could require large capital resources for construction.

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## 5. RECOMMENDATIONS FOR IMPLEMENTATION

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Any combination of the strategies mentioned in the previous chapter may be used to reduce the impervious area of parking lots in Northwest Connecticut. The strategies most applicable to the region include amending parking standards, shared parking, parking areas of pervious materials, and landscaping. Changes to zoning regulations would be the most direct way to implement most of these strategies. As noted above, zoning regulations could include the following changes:

- Include provisions and guidelines for shared parking
- Establish maximum and well as minimum parking requirements
- Require landscaping such as trees and shrubs, which reduce the amount of storm water runoff
- Offer incentives for constructing parking lots of pervious materials

Phase II of this study will be the development of model zoning regulations and will evaluate potential changes in greater detail.

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## 6. CONCLUSIONS

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The parking survey was administered at 42 locations within towns that are part of the NWCCOG and LHCEO. Each parking lot was visited on two separate dates. Parking lots were surveyed for the following land uses:

- Banks
- Big Box Retail (e.g. Home Depot)
- Free-Standing Retail (e.g. CVS)
- Small Shopping Centers
- Drive-Thru Restaurants
- Restaurants
- Industrial Plants
- General Office Buildings
- Medical Office Buildings
- Nursing Homes

The surveyed parking lots were selected because the businesses they serve are free-standing (i.e., they serve only one business). At the lots chosen for the survey, it is unlikely that people park in the lots and then walk to other businesses.

Zoning requirements in each community where lots were surveyed were compared to the amount of existing parking for each land use. Several conclusions can be drawn from the survey results and the comparison of zoning requirements to parking lot usage. They include:

- The majority of the parking lots surveyed were underutilized.
- In most cases, the demand for parking is less than what is required by zoning, but more parking than required by zoning has been provided.
- Zoning requirements for number of parking spaces did not correlate with the demand for parking (as reflected in occupancy rates) for most of the businesses surveyed
- The occupancy rate was not consistently higher for those lots that met the zoning requirements most closely
- Where zoning requirements for parking correlate the number of required spaces to the number of employees and patrons (versus the building square footage), the amount of parking available still exceeds demand
- Factors other than zoning requirements appear to be influencing parking lot design

- A variety of market factors appear to have a greater impact on parking demand than the factors typically used to establish zoning requirements
- The majority of the parking lots surveyed had occupancy rates much lower than the desired 85 to 95 percent.
- All of the parking lots surveyed are freestanding in that there are no adjacent businesses whose patrons might use the lot in question. Therefore, if the zoning requirements truly reflected parking demand, the occupancy rate for the lots would have been expected to be consistently much higher. The only instance where the number of parking spaces exactly matched the zoning requirements and the lot was more than 90% occupied was an industrial site in Winsted. This business had 63 employees, is required to have one parking space per employee, has exactly 63 parking spaces, and the maximum occupied spaces observed was 92%.

The results of the survey data for this study indicate a need for parking demand to be more accurately quantified if parking standards in zoning regulations are to provide the amount of parking actually appropriate to a specific land use. Other parking provisions established by one or more of the towns surveyed that should be reconsidered include:

- Many towns have no provision for an allowed reduction in required spaces if some can be conveniently and safely accommodated with existing on-street parking. This may provide a viable option for select land uses in select situations.
- Shared parking provisions most often relate to adjacent uses where one is predominantly a daytime use and the other predominantly an evening use. If parking demand can be accurately quantified for shared parking for businesses active at the same time of day, this may allow economies of scale for total size of a parking lot.
- Many of the towns surveyed did not have separate parking standards for mixed-use shopping centers. Again, shared parking standards for businesses active at the same time of day in the same location may allow economies of scale for total size of a parking lot.
- Not all of the zoning regulations reviewed had clear requirements for handicapped parking accommodation. Many of the businesses surveyed did not have plainly marked handicap spaces available. Although the Americans with Disabilities Act (ADA) does provide some requirements for handicap spaces, it would benefit any set of zoning regulations to acknowledge the need to meet ADA requirements and/or to specify handicap space requirements. It is beneficial for handicap spaces to have somewhat larger dimensions than standard spaces with appropriate striping to delineate the spaces to accommodate vehicles with wheelchair lifts.

Strategies for reducing impervious parking area should be considered for the region. These include parking standards in local regulations, shared parking, and parking areas constructed of pervious materials.

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## REFERENCES

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- American Planning Association. 1991. *Off-Street Parking Requirements*. American Planning Association. Washington, DC. 7-26.
- Cahill Associates. March 19, 2002. <http://www.thcahill.com/porous.htm>.
- Invisible Structures, Inc. March 18, 2002. <http://www.invisiblestructures.com/>.
- Institute of Transportation Engineers. 1995. *Shared Parking Planning Guidelines*. Institute of Transportation Engineers. Washington, DC. 4-22.
- Institute of Transportation Engineers. 1999. *Traffic Engineering Handbook 5<sup>th</sup> Edition*. Institute of Transportation Engineers. Washington, DC.
- Papacostas, C.S. and Prevedouros, P.D. 1993. *Transportation Engineering and Planning Second Edition*. Prentice Hall. Englewood, NJ. 455.
- Tarmac America. March 21, 2002.  
<http://www.tarmacamerica.com/tarmac/products/readymix/pervious.html>.
- The Nonpoint Education for Municipal Officials Program. January 26, 2002.  
<http://nemo.uconn.edu/r2/index.htm>.
- Unilock. July 19, 1999. <http://www.unilock.com/permeable/index.html>.

**APPENDIX A: PARKING SURVEY FORM**

**APPENDIX B: PERCENT OCCUPIED REGULAR PARKING SPACES**

**APPENDIX C: OCCUPIED AND AVAILABLE PARKING SPACES PER 1,000  
S.F. OF BUILDING AREA**

## **APPENDIX D: ZONING COMPARISON TABLE**