
Logistics Management Institute

Comparison of Levels of Service for Building Operations

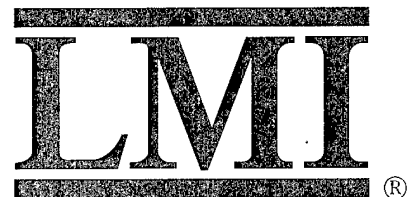
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July 2001

Marguerite M. Morrell
Rose G. Polar

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Comparison of Levels of Service for Building Operations

INTRODUCTION

The Public Buildings Service (PBS), one of three services within the General Services Administration, provides work environments for more than 1 million federal employees nationwide. PBS serves as a builder, developer, lessor, and manager of federally owned and leased properties providing a full range of real estate services. Those services include real estate brokerage, property management, construction and repairs, security services, property disposal, and overall portfolio management. As part of its program, PBS periodically compares the costs of its building operations—utilities, cleaning, roads and grounds, and maintenance and repair—with private-sector costs for these services as published in the Building Owners and Managers Association (BOMA) Experience Exchange Report (EER). To help PBS better understand the cost differences between its building operations and those of the private sector, LMI compared the levels of service provided by PBS building managers with those provided by private-sector organizations.

APPROACH

LMI's approach to comparing PBS and private-sector levels of service was to conduct a survey using a questionnaire developed jointly with PBS and BOMA. The questionnaire covered utilities, cleaning, roads and grounds, and maintenance and repair services. Appendix A contains the survey instrument.

During fall 2000, we mailed 660 surveys to BOMA EER respondents and 40 to PBS buildings in five markets meeting the criteria from BOMA's most recent EER data. These markets are Atlanta, Boston, Chicago, Dallas, and Los Angeles. The survey elicited 111 valid responses from BOMA, a 17 percent response rate, and 40 from PBS, a 100 percent response rate.

SURVEY RESULTS AND CONCLUSIONS

The survey results for utilities indicated that PBS has more buildings with high-energy use space than the private sector. PBS and private-sector organizations install energy management systems at about the same rate. In general, buildings with energy management systems have lower unit costs than buildings without energy management systems. PBS tends to perform energy audits more often than the private sector. PBS implements recommended upgrades about 55 percent of the time and has lower costs in buildings with audits. PBS's cost for utilities is

about 20 percent lower than the private-sector cost. Appendix B contains a full statistical analysis of the responses to the survey questions about utilities.

The level of cleaning service provided by PBS is slightly lower than that provided by the private sector. In general, compared with the private sector, PBS performs these tasks less often: full vacuuming, vacuuming of low-traffic carpet, cleaning of furniture, trash removal from the building site, and cleaning of computer monitors. PBS's cost for cleaning is about 10 percent lower than the private-sector cost. Appendix C contains a full statistical analysis of the responses to the survey questions about cleaning service.

The level of roads and grounds service provided by PBS and the private sector is similar. The most significant difference concerns garage sweeping and sidewalk hosing; PBS performs those tasks in a higher percentage of its buildings. Appendix C contains a full statistical analysis of the responses to the survey questions about roads and grounds service.

In the case of maintenance and repair, survey responses demonstrated that, in general, PBS performs preventive maintenance on a higher percentage of its buildings and systems and does so more frequently than the private sector. For seven of eight systems, PBS performs preventive maintenance in more than two-thirds of its buildings. PBS generally renovates its building systems at about the same rate as the private sector. An exception is fire/life safety systems; the private sector has renovated those systems in about half of its buildings, while PBS has renovated one-third. PBS's cost for maintenance and repair is about 10 percent lower than the private-sector cost. Appendix D contains a full statistical analysis of the responses to the survey questions about maintenance and repair.

To address concern about smaller buildings skewing the survey results, we excluded buildings of less than 100,000 square feet (SF) from both the PBS and the BOMA samples. Then, we compared the responses to 10 survey questions by the sample of larger buildings only with those from the entire sample.¹ The results showed that there is no significant difference in the overall survey results when smaller buildings are excluded.

In conclusion, robust statistical analysis was not possible due to the relatively small sample sizes as compared with the large number of variables. We found no substantial differences in typical values for variables in high cost and low cost building groups. Consequently, cost variations cannot be attributed to common service level variations.

¹ Survey questions 2, 3, 4, 5, 14, 20, 25, 26, 27, and 28.

APPENDIX A. SURVEY INSTRUMENT

This appendix contains the survey instrument developed jointly by PBS, BOMA, and LMI.

Survey Instrument

A-3

Level of Service Associated with Building Operations

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Instructions

BOMA and the U.S. General Services Administration are teaming together to bring our industry a more detailed understanding of the cost data contained within the EER. Your participation is critical to the success of this project. Please take a few minutes of your time to complete a survey for each building you submitted EER data and return it to us by **NOVEMBER 17TH**. Completed surveys should be returned using the enclosed return envelope or faxed to BOMA at 202-371-0181. If you have questions regarding the project or the survey instrument, please send them to eer@boma.org.

Respondent Information

Contact name:
Building name:
Address:
Suite:
City:

State:

Zip:

Year-end asking rent: \$_____ per square foot per year

Utilities

- (1) Average after hour usage/charges per week: ____ Hrs/week
- (2) Does this facility have high energy use space? ____ Yes ____ No
If yes, square footage of space: _____
KWH/year: _____ KW peak demand: _____
- (3) Does the building have an energy management system? ____ Yes ____ No
- (4) Has the building recently had an energy audit performed? ____ Yes ____ No
If yes, have upgrades been performed to provide efficient lighting and equipment? ____ Yes ____ No
- (5) Did the utilities cost you reported in the EER include all tenant reimbursable charges? ____ Yes ____ No
- (6) Indicate the average annual unit cost of:
- | | |
|---------------|-------------------------|
| Electric | \$ _____ /KWH |
| Gas | \$ _____ /CCF |
| Fuel Oil | \$ _____ /US Gals |
| Steam | \$ _____ /1000 lbs |
| Chilled Water | \$ _____ /1000 tons-hrs |
| Water/Sewer | \$ _____ |

Cleaning

- (7) Cleaning performed by (check one): ____ In-house staff ____ Contractor ____ Combination
- (8) If contractor, indicate type of contract:
____ Prescriptive (task frequency)
____ Performance based
____ Other (specify): _____
- (9) If in-house, indicate the total number of in-house cleaning personnel:

Category	Number of in-house cleaning personnel
Full time	
Part time	

- (10) If in-house, is the cleaning staff predominately (check one): ____ Union ____ Non-union

(11) Estimate the percent level of cleaning service provided in each category: ____ % Basic ____ % Prestige ____ % Clinical

(12) Square footage of building carpeted: _____ sq/ft

(13) Percentage of carpets shampooed: _____ %
If any, average number of shampoos per year: _____

(14) Indicate the frequency of tasks performed by cleaning personnel (check all that apply):

Task	Task Frequency									
	Multiple times daily	Once per day	3-4 times per week	Twice per week	Once per week	1-3 times per month	3-4 times per year	Twice per year	Once per year	Not done
Furniture cleaning A. dust desks / shelves B. clean furniture C. clean computer monitors										
Window cleaning D. clean window blinds, shades, covers E. clean interior windows F. clean exterior windows										
Mop / Spray Buff G. high traffic floors H. low traffic floors										
Vacuuming I. high traffic carpet J. low traffic carpet K. full vacuuming										
Trash removal L. from interior spaces M. from building site										
Recycling removal N. from interior spaces O. from building site										
Hazmat removal P. from interior spaces Q. from building site										
Restrooms R. restock restroom supplies, empty trash, and tidy area S. clean / sanitize commodes, urinals, and washbasins										
Other tasks T. clean air duct grilles / diffusers U. Remove / apply finishes to hard floor V. clean kitchen / coffee areas										
Other services W. restock coffee and other vending machines X. provide bottled water service Y. setup / cleanup for parties and special events Z. moving services AA. on-call assistance BB. pest control CC. signage										

Roads and Grounds Operations

(15) Roads and grounds performed by (check one):
☐ In-house staff ☐ Contractor ☐ Combination

(16) If contractor, indicate type of contract (check one):
☐ Prescriptive (task frequency)
☐ Performance based
☐ Other (specify): _____

(17) If in-house, indicate the total number of **in-house** roads and grounds personnel:

Category	Number of in-house roads and grounds personnel
Full time	
Part time	

(18) If in-house, is the roads and grounds staff predominately (check one): ☐ Union ☐ Non-union

(19) Area of improved/landscaped land (acreage): _____

(20) Indicate the tasks performed as part of roads and grounds service (check all that apply):

- ☐ Tree pruning
- ☐ Shrub trimming
- ☐ Planting
- ☐ Snow removal
- ☐ Grass cutting
- ☐ Hosing down sidewalks
- ☐ Sidewalk sweeping
- ☐ Parking garage cleaning / sweeping
- ☐ Other (specify): _____

Maintenance and Repair

(21) Maintenance and repair performed by (check one):
☐ In-house staff ☐ Contractor ☐ Combination

(22) If contractor, indicate type of contract (check one):
☐ Prescriptive (task frequency)
☐ Performance based
☐ Other (specify): _____

(23) If in-house, indicate the total number of **in-house** maintenance and repair personnel:

Category	Number of in-house maintenance and repair personnel
Full time	
Part time	

(24) If in-house, is the maintenance staff predominately (check one): ☐ Union ☐ Non-union

BUILDING SYSTEMS

(25) Indicate any building system that has been renovated, replaced or upgraded since the building was constructed.

System	Mark if system has been renovated, replaced or upgraded (check all that apply)	Year of renovation, replacement or upgrade
Elevators		
HVAC		
Electrical		
Structural		
Roof		
Fire/Life Safety		
Lighting		
Plumbing		
Other (specify):		

(26) What is the property management liability threshold regarding maintenance and repair costs of major building systems?
\$0- _____

(27) Are maintenance and repairs above the liability threshold, typically (check one):

___ performed by the property manager on a reimbursable basis

___ contracted to another company to perform the work

___ other (specify): _____

(28) At what dollar threshold are repair costs capitalized rather than expensed? \$ _____

(29) What is the negotiated service call response time for O&M contracts (indicate unit of measure for each category)?

Emergency _____

Urgent _____

Routine _____

(30) Do you perform preventative maintenance (PM) on any of your building systems (check all that apply)?

System	Indicate if system receives PM (check all that apply)	Number of times per year
Elevators		
HVAC (chiller, air handler, cooling tower, etc.)		
Electrical		
Structural		
Roof		
Fire/Life Safety		
Lighting		
Plumbing		
Other (specify):		

ELEVATORS

(31) Number of elevator door openings: _____

(32) Type of elevators (check one):

___ Gear / Traction

___ Hydraulic

___ Other (specify): _____

HVAC

(33) Type of system(s) (check all that apply):

- ☐ Purchased Steam
- ☐ Purchased Cooled Water
- ☐ Central chilled water plant with chillers, air handling units and cooling towers
- ☐ Central Boilers
- ☐ Hot water baseboard radiation
- ☐ Electric duct heaters
- ☐ Rooftop units
- ☐ Water cooled floor by floor air handlers
- ☐ Water cooled heat pumps
- ☐ Through the wall air conditioning units
- ☐ Fan coil units
- ☐ Other (specify): _____

ELECTRICAL

(34) Indicate where maintenance and repair responsibilities begin (check one):

- ☐ Company vault
- ☐ Electrical Switchgear Room
- ☐ Distribution Panel

FIRE/LIFE SAFETY

(35) What type of equipment is in the building (check all that apply):

- ☐ Smoke Detectors
- ☐ Sprinklers
- ☐ Emergency lighting
- ☐ Fire alarms
- ☐ Exit signs
- ☐ Intercom
- ☐ Heat detectors
- ☐ CO monitors
- ☐ Visual alarms
- ☐ Other (specify): _____

PREVENTATIVE MAINTENANCE

(36) Indicate if system has a PM program that is **above** the standard manufacturer's recommendation? If yes, please describe nature of program.

System	Indicate if system receives above manufacturer's recommended PM	Describe
Elevators		
HVAC (chiller, air handler, coolingtower, etc.)		
Electrical		
Structural		
Roof		
Fire/Life Safety		
Lighting		
Plumbing		
Other (specify):		

APPENDIX B. ANALYSIS OF SURVEY RESPONSES: UTILITIES

In this appendix, we present a complete analysis of the responses to the survey questions about utility services. We have organized the responses by survey question number, as follows:

<u>Question</u>	<u>Page</u>
Q1. Average after hour usage	B-3
Q2. Does this facility have high energy use space	B-6
Q3. Does this building have an energy management system	B-10
Q4. Has the building recently had an energy audit performed	B-16
Q5. Did the utilities cost you reported in the EER include all tenant reimbursable charges	B-20
Q6. Indicate the annual unit cost of utilities	B-22

QUESTION 1

Average after hour usage/charges per week: ____ Hrs/week

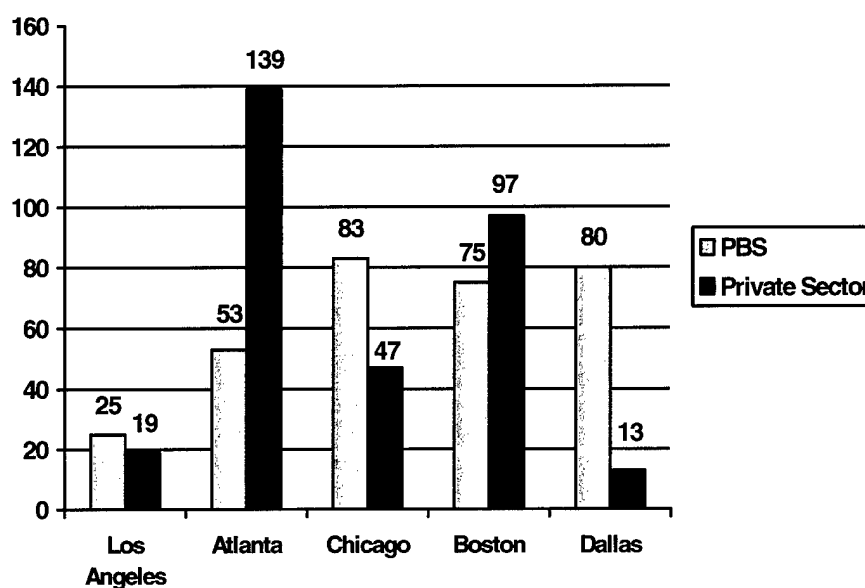
The following table summarizes survey responses:

Organization	Number of Responses	Average After Hour Usage Per Week
PBS	21	61.48
Private Sector	49	61.53

The following table and chart show average responses per city for both private sector and PBS buildings:

Organization	Los Angeles	Atlanta	Chicago	Boston	Dallas
PBS	24.50	53.00	82.66	75.33	80.20
Private Sector	18.80	138.70	47.20	96.57	12.50

Average After Hours Usage by City



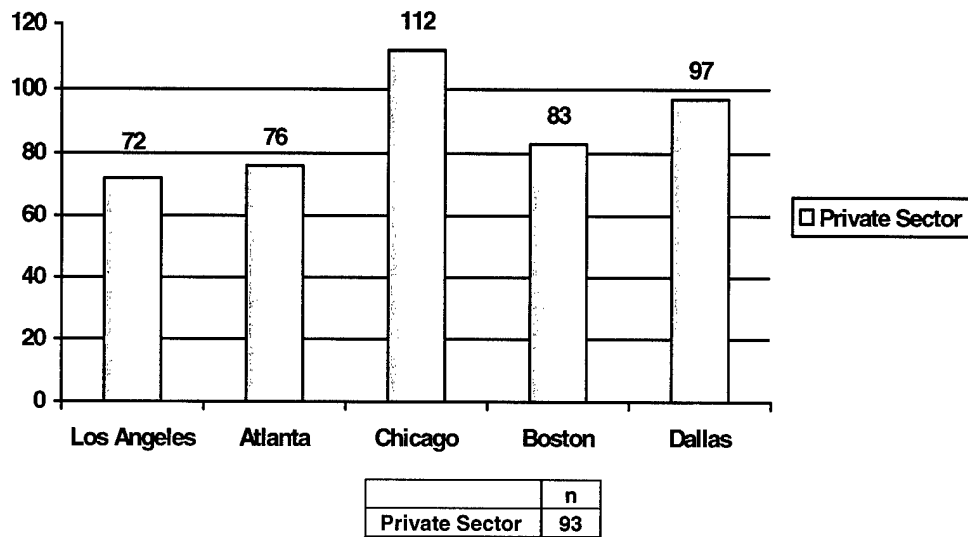
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PBS	21
Private Sector	49

Note: Because of a disparity of responses, we cannot come to any conclusion based on these findings. However, we also examined the responses to question 20D of the BOMA Experience Exchange Report for total number of hours per week the building is operational (including Saturday and Sunday).

The following table and chart summarize the average total number of operating hours per week by cities for private sector buildings:

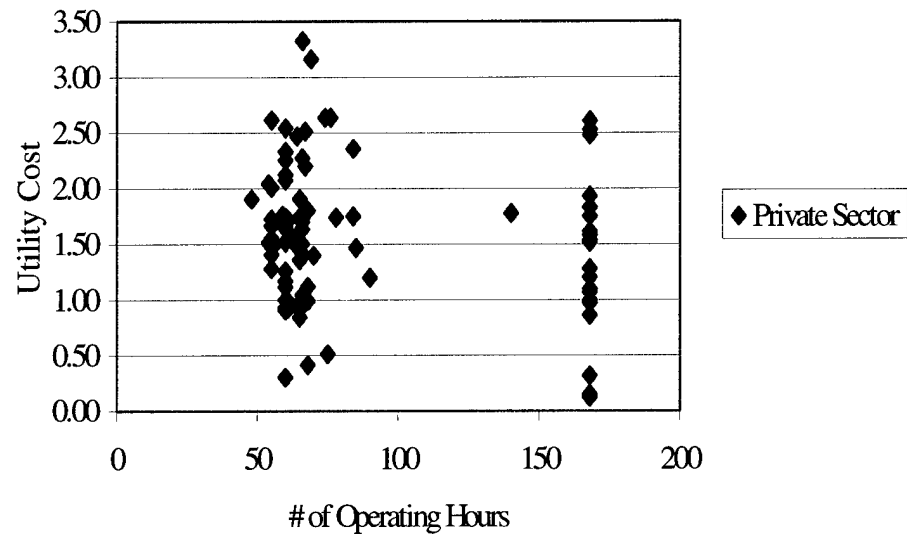
Cities	Average Number Of Operating Hours
Los Angeles	72
Atlanta	76
Chicago	112
Boston	83
Dallas	97
Whole Group	88

Average Number of Hours by City



The following graph plots the total operating hours for private sector buildings and the unit cost of utilities (\$/SF):

Number of Operating Hours vs. Utility Cost



QUESTION 2

Does this facility have high-energy use space? ___ Yes ___ No

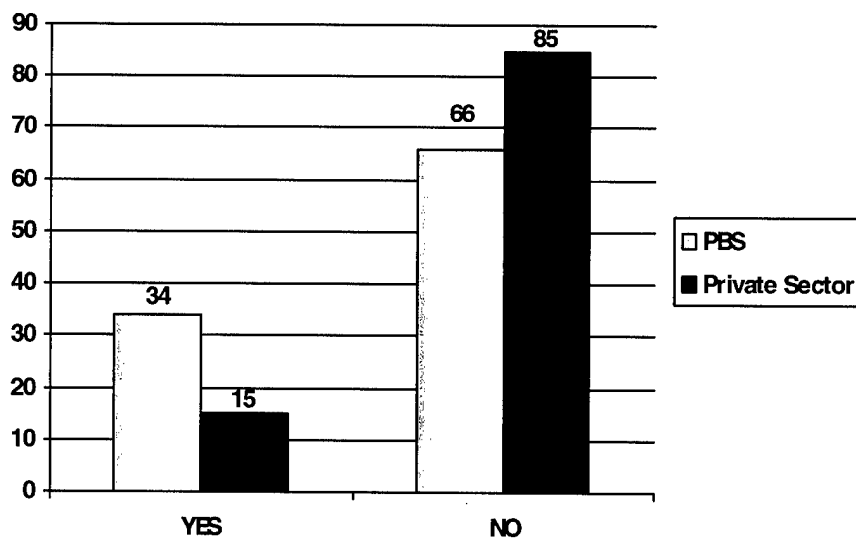
If yes, square footage of space: _____

KWH/year: _____ KW peak demand _____

The following table and chart summarize survey responses to high-energy use space:

Organization	Number of Responses	Percent Responded "Yes"	Percent Responded "No"
PBS	38	13 (34%)	25 (66%)
Private Sector	95	14 (15%)	81 (85%)

Percentage of Responses by Response

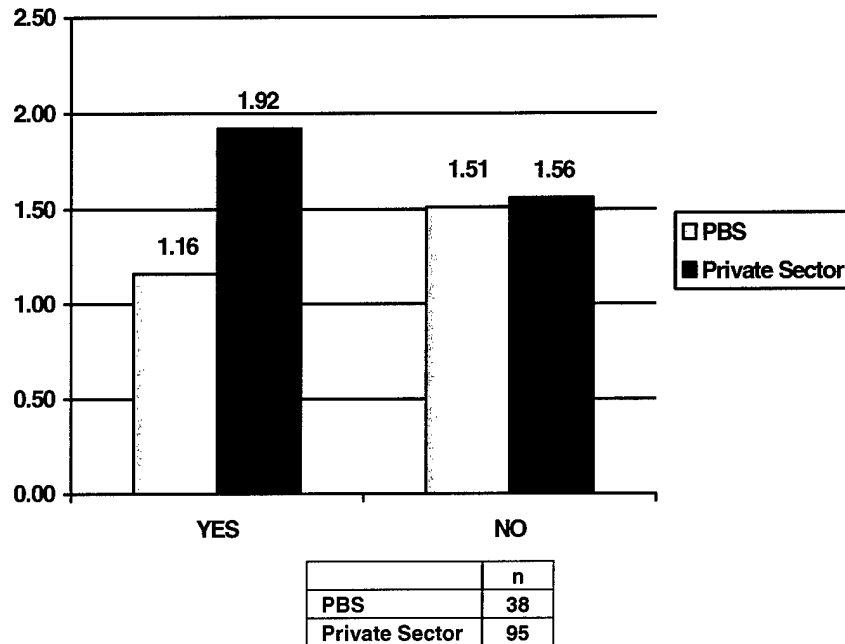


	n
PBS	38
Private Sector	95

Based on the responses we can conclude that most PBS and private sector facilities do not have high-energy use space. However, PBS buildings are twice as likely to contain high-energy space than private sector.

The following chart presents the average utility cost for buildings with and without high-energy use space for both PBS and the private sector:

Average \$/SF by Response



The chart above indicates that:

- ◆ PBS unit cost for utilities is lower than the private sector regardless of whether or not the buildings have high-energy space.
- ◆ PBS unit cost for utilities in buildings that have high-energy space is significantly lower than the buildings that do not have high-energy space. However, this is due to the mix of PBS cities reporting high-energy space. Of the 13 PBS buildings with high-energy space, 9 are in Atlanta and Dallas which have lower average unit costs than the other cities. The remaining, higher cost cities did not report that their buildings contained much high energy space

Note: We excluded data of less than \$0.35 and of more than \$5 per SF.

The following tables show the “Yes” responses for both PBS and the private sector, each building SF, their high energy SF and the percent of high-energy space. Some respondents did not indicate the amount of high-energy space.

PBS Survey ID	SF	High Energy SF	Percent of High Energy Space
MA0131ZZ	824,892	978,599	119 ^a
TX0057ZZ	157,949	29,377	19
TX0058DA	329,051	92,138	28
TX0284DA	904,847	275,379	30
TX0292ZZ	187,865	3,000	2
TX0302ZZ	324,970		
GA0007ZZ	328,275		
GA0008ZZ	158,339		
GA0087AD	793,029		
GA0121ZZ	991,986		
IL0054ZZ	559,222		
IL0209CF	181,240		
MA0050ZZ	719,126		
Average			20

^a Anomalous data

BOMA Survey ID	Building SF	High Energy SF	Percent of High Energy Space
13852	390,721	129,463	33
12840	369,983	20,000	5
28314	100,932	3,000	3
40361	149,417	4,681	3
21803	2,409,211	8,700	0
28303	106,338	3,000	3
28315	118,750	1,500	1
20596	378,538	5,492	1
26157	269,500	20,000	7
18131	715,051	40,695	6
21677	531,148	3,810	1
29473	791,306	33,832	4
3297	214,486	48,549	23
6034	136,991	3,500	3
17753	1,411,254		
Average			7

Note: Based on the survey responses, it appears that, in average, PBS buildings have a higher percent of high-energy space, more than twice private sector buildings average. However, no meaningful conclusion could be drawn because of the small sample size.

The following tables summarize survey responses for both private sector and PBS:

PBS Survey ID	KWH/Year	KW Peak Demand
GA0007ZZ		4,000
GA0008ZZ	1,528,200	
GA0121ZZ	16,096,557	
GA0125ZZ	560,750	
TX0058DA	1,934,418	
TX0200ZZ	20,611	
TX0284DA	1,499,743	
TX0292ZZ	280,000	

BOMA Survey ID	KWH/Year	KW Peak Demand
12840		1,408
18131	4,287,445	235
21677	401,440	
21803	1,449,780	165
29473	3,861,510	532
3297	8,167,680	775,680
6034		1,050

The following table shows the average responses for both private sector and PBS:

Organization	Number of Responses	Average KWH/Year
PBS	7	3,131,468
Private Sector	5	3,633,571

Note: There is some concern about the validity of the data and the limited response rate.

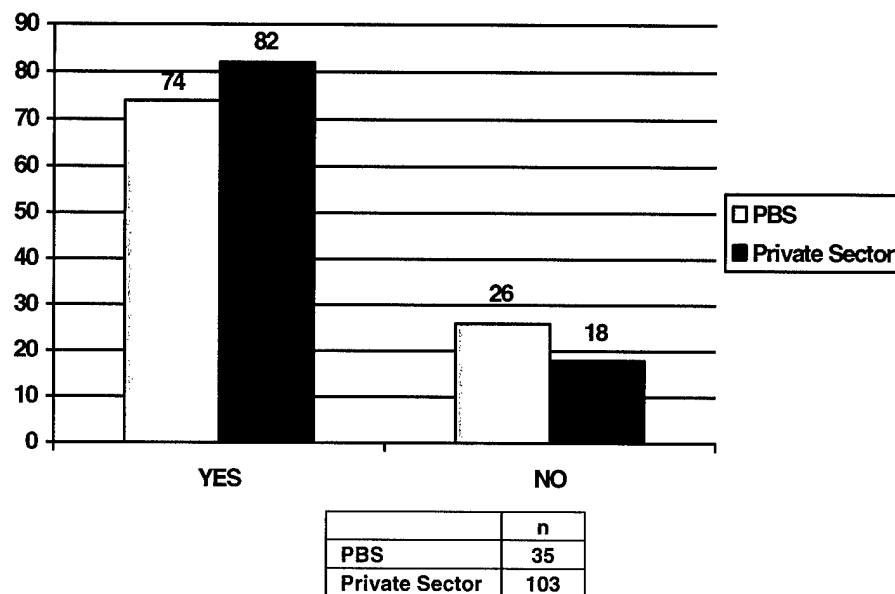
QUESTION 3

Does the building have an energy management system? ___ Yes ___ No

The following table summarizes survey respondents:

Organization	Number of Responses	Percent Responded "Yes"	Percent Responded "No"
PBS	35	26 (74%)	9 (26%)
Private Sector	103	84 (82%)	19 (18%)

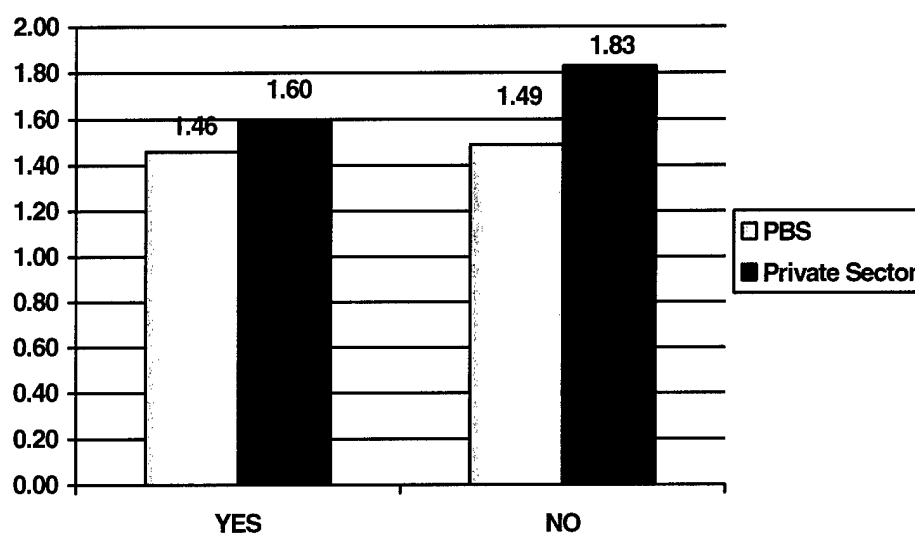
Percentage of Responses by Response



Based on the survey responses, we can conclude that, in general, both PBS and private sector buildings have an energy management system.

The following chart presents the average cost of utility with and without an energy management system for both PBS and private sector. Please note that we excluded buildings that appear to have abnormally unit costs for utilities (<0.40 and >5.00).

Average \$/SF by Response



	n
PBS	35
Private Sector	103

The following table shows the average SF for buildings that have energy management systems and the ones that do not for both PBS and the private sector:

Organization	Average SF for "Yes" Responses	Average SF for "No" Responses
PBS	470,279	271,071
Private Sector	461,023	246,648

From the survey responses, we can conclude that:

- ◆ PBS unit cost for utilities is lower than of private sector regardless of whether or not the buildings have an energy management system.
- ◆ PBS unit costs for utilities in buildings that have an energy management are lower than the unit costs in buildings that do not have an energy management system.

The following tables summarize responses for both PBS and private sector, each building SF, their utility cost and their unit cost for utility:

PBS Survey ID	Response	Building SF	Utilities \$	\$/SF
CA0150CC	N	1,015,311	1,324,691	1.30
CA0168ZZ	Y	518,951	769,358	1.48
CA0191ZZ	Y	204,338	213,593	1.05
CA0224ZZ	Y	206,979	286,555	1.38
CA0273ZZ	Y	216,512	337,303	1.56
CA0283CC	Y	743,241	1,615,200	2.17
GA0008ZZ	Y	158,339	114,238	0.72
GA0087AD	Y	793,029	1,047,841	1.32
GA0121ZZ	Y	991,986	1,194,748	1.20
GA0125ZZ	Y	50,453	42,460	0.84
GA0501AA	N	2,110	3,553	1.68
IL0054ZZ	Y	559,222	774,679	1.39
IL0205ZZ	Y	1,259,381	1,977,603	1.57
IL0209CF	Y	181,240	103,581	0.57
IL0235FC	Y	183,352	997,033	5.44
IL0236FC	Y	1,116,972	1,708,040	1.53
MA0050ZZ	Y	719,126	1,596,493	2.22
MA0131ZZ	Y	824,892	1,554,490	1.88
MA0138ZZ	N	5,745	9,659	1.68
MA0153ZZ	Y	645,989	638,653	0.99
CA0041ZZ	Y	703,302	959,286	1.36
CA0149ZZ	N	67,197	25,472	0.38
CA0185ZZ	N	13,810	32,251	2.34
CA9551RR	Y	145,550	279,702	1.92
MA0011ZZ	Y	134,400	304,623	2.27
MA0013ZZ	Y	556,865	997,897	1.79
MA0076ZZ	N	3,249	5,946	1.83
MA0135ZZ	N	7,571	12,173	1.61
MA0158ZZ	Y	26,700	62,302	2.33
IL0032ZZ	Y	244,905	278,180	1.14
IL0231ZZ	N	31,943	11,444	0.36
IL0300ZZ	N	1,290	-3,424	-2.65
IL0303ZZ	Y	705,826	1,091,405	1.55
TX0057ZZ	N	157,949	252,210	1.60
TX0058DA	N	329,051	168,090	0.51
TX0200ZZ	Y	6,230	9,924	1.59
TX0284DA	N	904,847	786,651	0.87
TX0292ZZ	Y	187,865	224,582	1.20
TX0302ZZ	Y	324,970	306,561	0.94

BOMA Survey ID	Response	Building SF	Utilities \$	\$/SF
10047	N	101,938	171,537	1.68
10110	Y	360,815	644,683	1.79
10341	Y	525,830	832,370	1.58
10517	Y	394,324	574,626	1.46
12293	N	453,433	703,875	1.55
12443	Y	343,602	602,874	1.75
1251	Y	690,341	938,411	1.36
12839	Y	604,428	679,039	1.12
12840	Y	369,983	646,204	1.75
13030	N	978,335	828,882	0.85
13050	Y	634,381	955,719	1.51
13139	Y	252,870	583,530	2.31
13298	Y	252,180	357,840	1.42
13505	Y	151,296	194,137	1.28
13534	Y	79,800	133,946	1.68
13670	N	167,756	261,387	1.56
13852	Y	390,721	731,062	1.87
14097	Y	134,490	122,711	0.91
1412	Y	637,069	862,043	1.35
15818	Y	525,422	518,814	0.99
16271	Y	234,690	612,420	2.61
16334	Y	215,016	382,729	1.78
16423	Y	418,604	675,316	1.61
17651	N	173,492	26,425	0.15
17690	N	180,800	477,093	2.64
17753	Y	1,411,254	2,459,395	1.74
18131	Y	715,051	1,818,971	2.54
18157	Y	317,052	648,610	2.05
18464	Y	96,717	152,781	1.58
18811	Y	249,288	482,168	1.93
19667	Y	1,572,454	1,568,991	1.00
20035	Y	251,943	217,640	0.86
20266	Y	135,572	308,650	2.28
20300	N	293,003	559,371	1.91
20538	Y	622,487	750,132	1.21
20596	Y	378,538	575,386	1.52
21068	Y	211,352	310,488	1.47
21677	Y	531,148	1,198,591	2.26

BOMA Survey ID	Response	Building SF	Utilities \$	\$/SF
21703	Y	920,888	908,073	0.99
21803	Y	2,409,211	2,891,500	1.20
21900	Y	945,746	1,108,975	1.17
2373	Y	349,810	390,663	1.12
25015	Y	294,069	511,978	1.74
25048	Y	462,896	1,212,459	2.62
25382	N	480,450	842,518	1.75
25458	N	13,163	4,031	0.31
26056	Y	618,638	624,488	1.01
26105	Y	450,614	417,216	0.93
26156	Y	383,446	658,568	1.72
26157	Y	269,500	629,123	2.33
26183	N	27,436	30,147	1.10
26436	Y	64,208	95,307	1.48
27044	Y	151,349	399,623	2.64
27057	Y	240,000	302,675	1.26
27060	Y	546,785	1,384,520	2.53
2710	N	165,812	154,776	0.93
27128	Y	252,496	435,995	1.73
27194	Y	232,285	494,093	2.13
272	N	92,933	140,785	1.51
28024	N	86,059	27,332	0.32
28049	Y	238,663	362,532	1.52
28055	Y	69,077	68,757	1.00
28082	Y	1,125,341	1,873,438	1.66
28301	Y	57,967	99,665	1.72
28302	Y	78,907	142,422	1.80
28303	Y	106,338	234,518	2.21
28314	Y	100,932	165,439	1.64
28315	Y	118,750	202,096	1.70
28316	Y	92,600	149,596	1.62
28398	N	116,993	233,626	2.00
28672	Y	349,270	640,922	1.84
28716	Y	133,282	257,617	1.93
29079	Y	225,069	335,988	1.49
29088	Y	256,535	257,469	1.00
29109	N	47,421	157,686	3.33
29118	Y	332,608	0	0.00

BOMA Survey ID	Response	Building SF	Utilities \$	\$/SF
29423	Y	21,000	8,800	0.42
29424	Y	21,000	10,811	0.51
29473	Y	791,306	96,785	0.12
29592	Y	600,000	910,073	1.52
29625	Y	104,282	33,324	0.32
29808	Y	1,010,520	1,679,788	1.66
29847	Y	2,003,288	2,383,576	1.19
29856	Y	369,134	685,390	1.86
3297	N	214,486	678,546	3.16
3895	N	175,739	342,541	1.95
40034	Y	183,920	192,638	1.05
40064	Y	326,737	811,150	2.48
40065	Y	355,869	585,161	1.64
40075	Y	133,594	181,746	1.36
40088	Y	215,016	3,827,289	1.78
40108	N	25,870	3,760	0.15
40145	Y	188,706	466,551	2.47
40204	Y	486,935	1,011,508	2.08
40275	N	157,584	300,095	1.90
40361	Y	149,417	209,437	1.40
40437	Y	1,462,488	2,058,677	1.41
5221	N	138,000	325,604	2.36
5222	N	182,300	458,999	2.52
5399	Y	398,726	584,802	1.47
6034	Y	136,991	210,864	1.54
813	N	575,294	523,515	0.91
8224	Y	1,194,853	1,093,526	0.92
8277	Y	2,086,136	2,670,253	1.28
8392	N	136,603	146,092	1.07
8581	Y	626,684	1,261,325	2.01
8590	Y	133,594	181,746	1.36
9317	Y	872,880	850,527	0.97
9320	Y	228,601	369,145	1.61
9517	Y	266,467	468,926	1.76

QUESTION 4

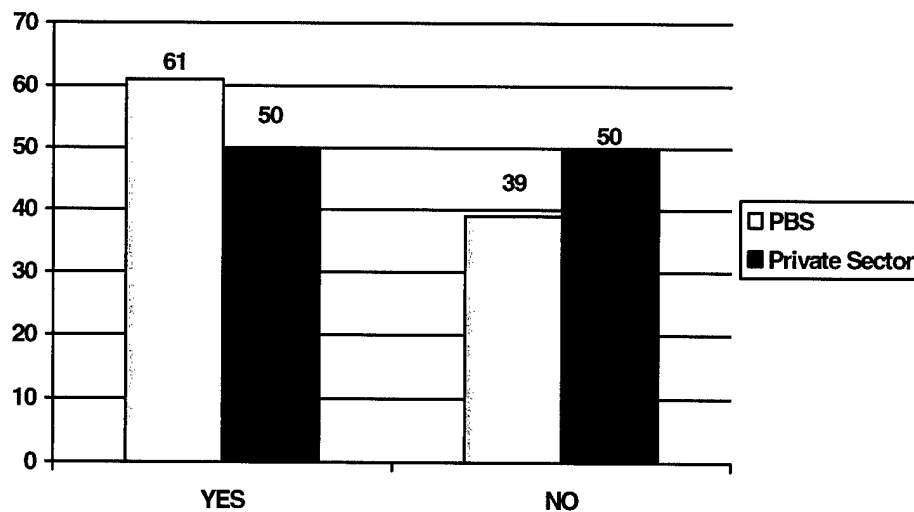
Has the building recently had an energy audit performed? ___ Yes ___ No

If yes, have upgrades been performed to provide efficient lighting and equipment? ___ Yes ___ No

The following table summarizes survey responses for both PBS and private sector:

Organization	Number of Responses	Percent Responded "Yes"	Percent Responded "No"
PBS	38	23 (61%)	15 (39%)
Private Sector	101	50 (50%)	51 (50%)

Percentage of Responses by Response

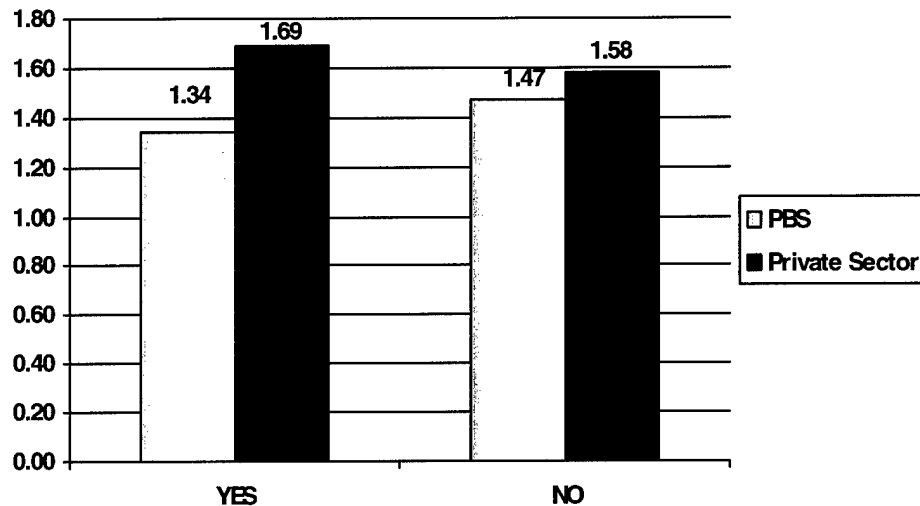


	n
PBS	38
Private Sector	101

The chart shows that PBS conducts energy audit significantly more than private sector.

The following chart presents the average utility cost for buildings that have and have not performed an energy audit for both PBS and private sector. Please note that we excluded two anomalous \$/SF data for PBS for over \$5.00 and less than \$0.

Average \$/SF by Response



	n
PBS	38
Private Sector	101

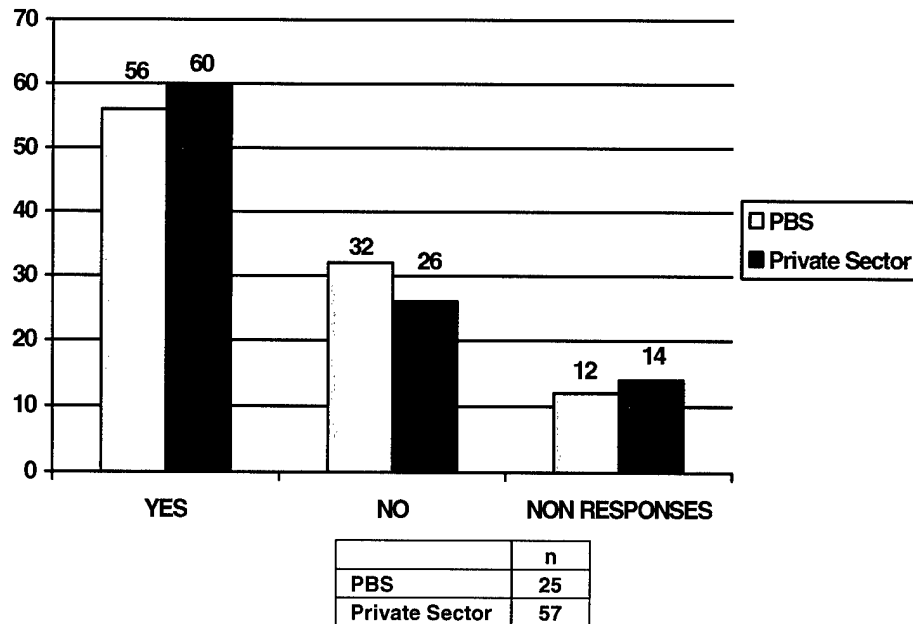
The chart shows that:

- ◆ PBS unit costs for utilities is lower than the private sector regardless of whether or not buildings have performed an energy audit.
- ◆ PBS unit costs for utilities in buildings that have performed an energy audit is significantly lower than the buildings that have not performed an audit cost.

The following table shows survey responses to whether upgrades have been performed:

Organization	Percentage of "Yes" Responses	Percentage Responded "Yes"	Percentage Responded "No"	Percentage Non Responses
PBS	25	14 (56%)	8 (32%)	3 (12%)
Private Sector	57	34 (60%)	15 (26%)	8 (14%)

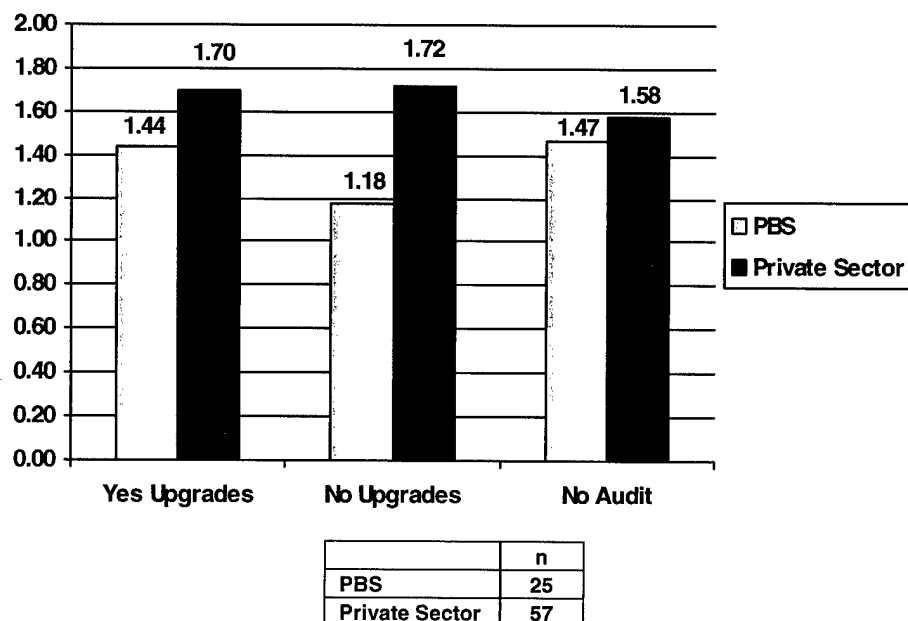
Percentage of Responses by Response



Based on the survey responses, we can conclude that more than half the PBS and private sector buildings that had an energy audit have performed upgrades to provide efficient lighting and equipment.

The following chart shows the average utility cost for buildings that have performed upgrades, buildings that have not and for buildings that have not had an energy audit performed for both PBS and private sector:

Average \$/SF by Response



The chart above shows that:

- ◆ PBS unit costs for utilities is lower than private sector regardless of whether or not upgrades were performed.
- ◆ PBS unit costs for utilities in buildings that have performed upgrades is higher than the buildings that have not performed upgrades but lower than those buildings that did not have an energy audit. However due to small number of buildings in the group that did not implement upgrades, this could be an anomalous result.

Note: We excluded data of less than \$0.35 per SF.

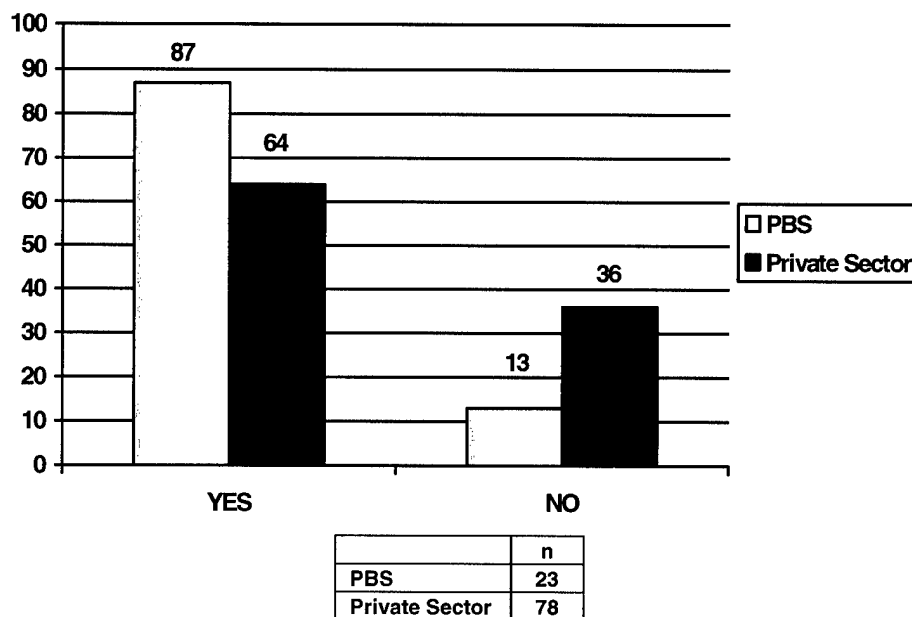
QUESTION 5

Did the utilities cost you reported in the EER include tenant reimbursable charges? ___ Yes ___ No

The following table summarizes survey responses:

Organization	Number of Responses	Percent Responded "Yes"	Percent Responded "No"
PBS	23	20 (87%)	3 (13%)
Private Sector	78	50 (64%)	28 (36%)

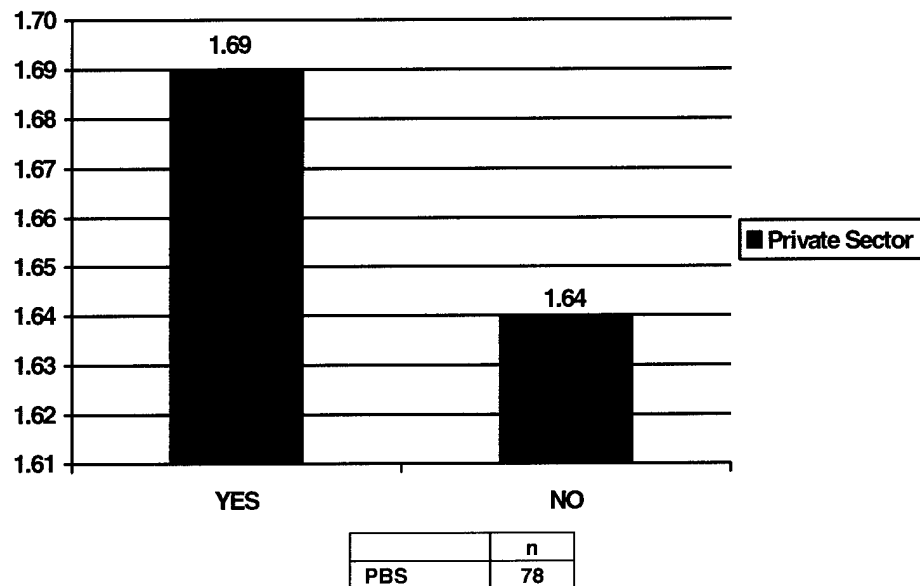
Percentage of Responses by Response



Based on the responses, we can conclude that about two thirds of private sector buildings reported tenant reimbursable charges in their utility cost data.

The following chart represents the average utility cost for private sector:

Average \$/SF by Response



The chart illustrates that:

- ◆ There is about a \$0.05 increase in private sector utility cost per SF if reimbursables are included.

Note: We excluded data of less than \$0.35 per SF.

QUESTION 6

Indicate the average annual unit cost of:

Electric \$ _____/KWH
Gas \$ _____/CCF
Fuel Oil \$ _____/US Gals
Steam \$ _____/1000 lbs
Chilled Water \$ _____/1000 tons-hrs
Water/Sewer \$ _____

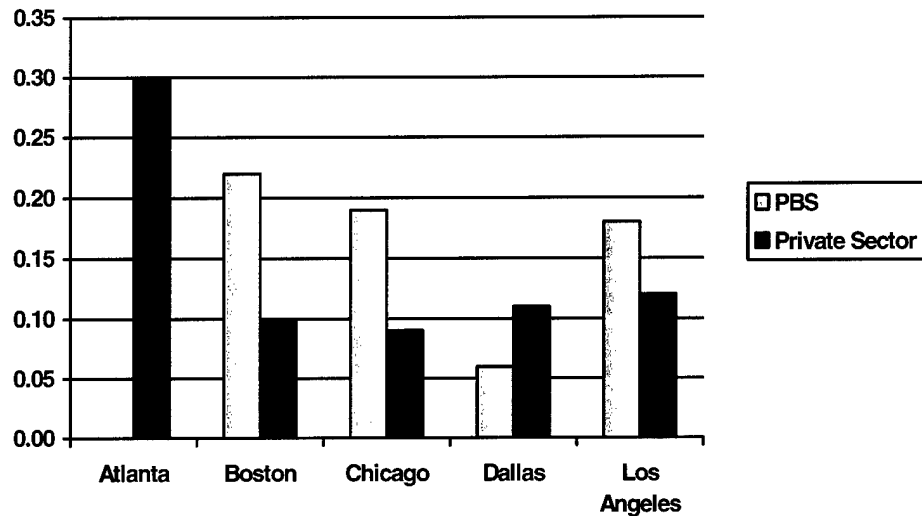
The following table illustrates the average annual unit cost for electric and gas for both PBS and private sector:

Cities	Electric Unit Cost Average		Gas Unit Cost Average	
	PBS	Private Sector	PBS	Private Sector
Atlanta		0.30		
Boston	0.22	0.10	0.24	0.23
Chicago	0.19	0.09	0.40	0.27
Dallas	0.06	0.11	0.00	0.19
Los Angeles	0.18	0.12	0.31	0.75

In order to calculate the unit cost average for electric and gas, we did not include data of more than \$1. Blank values represent no responses from that particular city.

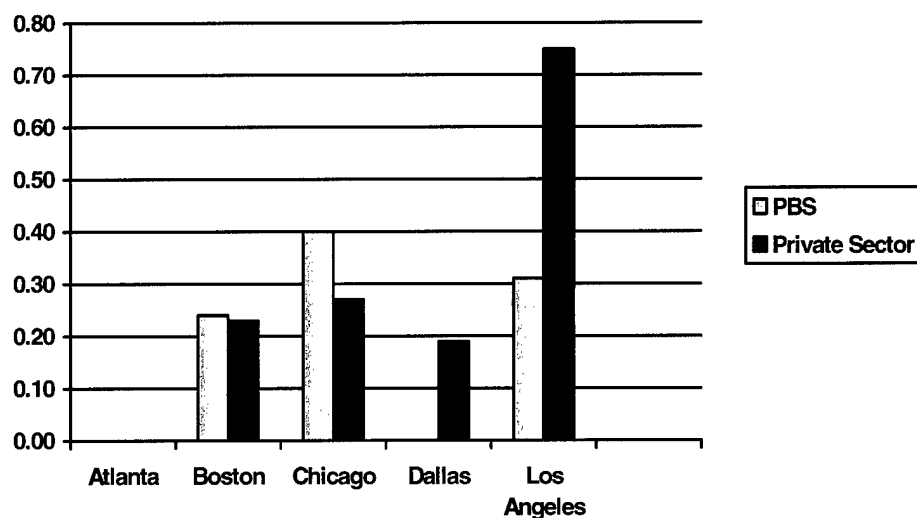
The following charts illustrates the average annual unit cost for electric and gas by cities for both PBS and private sector:

Average Cost by City



	n
PBS	21
Private Sector	57

Average Cost by City



	n
PBS	13
Private Sector	16

Based on the survey responses, it appears that:

- ◆ PBS average annual unit cost of electric is generally higher than private sector. Except for Dallas, where the average annual unit cost of electricity is half the private sector cost.
- ◆ PBS average annual unit cost of gas is generally higher than private sector. Except for Los Angeles, where the average annual unit cost of gas is more than half the private sector cost.

Note: There is some concern about the validity of the data. Therefore, we are unable to draw any conclusions based on such data.

We have added data tables for both PBS and private sector showing survey responses for utilities annual average unit costs by buildings:

PBS Survey ID	Electric	Gas	Fuel Oil	Steam	Chilled Water	Water/ Sewer
CA0150CC	1,452,766	132,482				24,548
CA0168ZZ	8.63	0.25				2.35
CA0191ZZ	242,944	6,133				7,200
CA0224ZZ	8.11	0.31				1.27
CA0273ZZ	2,907,00	5,637				10,164
CA0283CC	1,587,552					58,789
GA0007ZZ	212,300	24,000				25,000
GA0008ZZ	94,800	8,600				9,300
GA0087AD	846,600	28,000				88,000
GA0121ZZ	967,000	71,700				84,000
GA0125ZZ	48,300	4,000				4,700
GA0501AA	752	1,200				131
IL0054ZZ	0.07	3.49	5		2,200	
IL0209CF	7.82	3.56				
IL0235FC	0.07	0.40			206	
IL0236FC	0.07	0.40			206	
MA0050ZZ	0.83	0.13	0.84			
MA0131ZZ	0.10			16		60.21
MA0138ZZ	0.10	0.82				
MA0153ZZ	0.09	1.73				
CA0041ZZ	0.03	0.21				1.90
CA0149ZZ	0.03	0.49				2
CA0185ZZ	0.03	0.21				1.98
CA9551RR	0.65	0.38				1.99
MA0076ZZ	1.08		7,177			550
MA0135ZZ	0.10	0.01				
MA0158ZZ	0.10	0.01				644
IL0032ZZ	0.08	3.71				
IL0303ZZ	0.66					
TX0057ZZ	0.06	0.01				18,738
TX0058DA	0.06	0.01				10,846
TX0200ZZ	0.06	0.01				3,033
TX0284DA	0.06	0.01				30,751
TX0292ZZ	0.06	0.01				19,210
TX0302ZZ	0.06	0.01				25,110

BOMA Survey ID	Electric	Gas	Fuel Oil	Steam	Chilled Water	Water/ Sewer
10110	0.06		300			
10517	0.04	6.95				0.37
12293	0.09	0.27				
12443	0.06					4.19
1251	0.04	0.40				15.26
12840	0.59					4.62
13030	801,569					32,401
13050	0.05					40,962
13139	0.07					
13298	0.09	0.23				
13534	0.09					
13670	241,602					19,785
13852	5.80					
14097		17,050				
1412	0.12	5.80				0.22
15818	0.03					4.95
16271	0.01					
16423	0.06	0.19				0.26
17690	0.11	0.79				5
17753	0.06					
18131	0.11					0.06
18157	0.11					3.53
18464	0.08					3.38
19667	0.04					
20035	0.04					
20266	0.09					
20538	0.08					2.34
20596	0.06					1.60
21068	0.11					0.09
21677	0.11					0.06
21703	0.40					
21803	0.05	0.11				3.50
21900	0.06					
2373	738,465	21,521				
25382	0.08	0.05				62,000
25458	3,000					1,500
26056	5.50					1,250

BOMA Survey ID	Electric	Gas	Fuel Oil	Steam	Chilled Water	Water/ Sewer
26105	0.06					4.95
26156	0.13					14,900
26157	1.17	10.38				22.73
27044	0.11	1.08				3
27057	0.10	0.59				0.92
2710	0.08					14.41
27128	0.55	0.54				2.63
28055	53,102	19,681				5,760
28082	0.04					
28301	6.42					
28302	6.42					
28303	6.42					
28314	6.42					
28315	6.42					
28316	6.50					
28398	0.07					
28672	0.05					4.04
28716	0.08					2.75
29079	0.06					1.65
29088	0.07					1,500
29423						1.75
29424			1.25			1.75
29473	2.50					1.65
29808	0.03		2.47			15.26
29847						15
29856	0.06		300			
3297	0.09	0.77				3.19
3895	0.09	0.44				14,901
40034	0.09	0.23				
40204	0.85					
40361	0.68					
40437	0.10					60
5221	0.12	0.79				5.61
5222	0.11	0.79				5.61
5399	0.06					3.05
813	0.03					
8277	0.05	0.27				14.52

BOMA Survey ID	Electric	Gas	Fuel Oil	Steam	Chilled Water	Water/ Sewer
8392	0.06					
8581	0.09			0.09	0.25	
9317	0.09					8.34

APPENDIX C. ANALYSIS OF SURVEY RESPONSES: CLEANING AND ROADS/GROUNDS SERVICES

In this appendix, we present a complete analysis of the responses to the survey questions about cleaning and roads and grounds services. We have organized the responses by survey question number, as follows:

<u>Question</u>	<u>Page</u>
Cleaning services	
Q7. Contract/in-house labor	C-3
Q8. Type of contract	C-4
Q9. Full-time/part-time personnel mix (in-house labor)	C-5
Q10. Union/non-union	C-8
Q11. Level of cleaning service	C-9
Q12. Area of building carpeted	C-12
Q13. Percent of carpets shampooed	C-14
Q14. Frequency of tasks	C-16
Roads and grounds services	
Q15. Contract/in-house labor	C-41
Q16. Type of contract	C-42
Q17. Full-time/part-time personnel mix (in-house labor)	C-43
Q18. Union/non-union	C-46
Q19. Area of improved landscape	C-48
Q20. Tasks performed	C-49

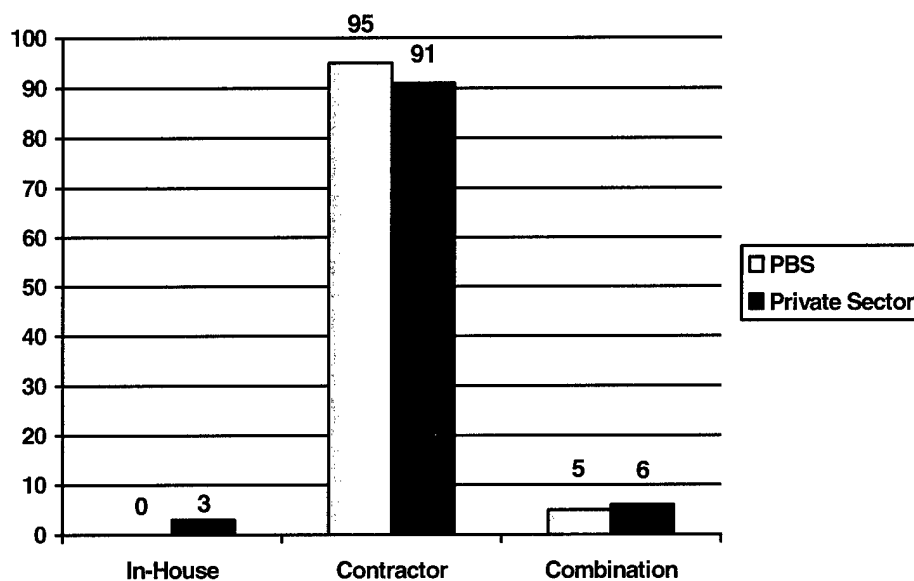
QUESTION 7

Cleaning performed by (check one): ___ In-house staff ___ Contractor
___ Combination

The following table summarizes survey responses:

Organization	Number of Responses	In-house	Contractor	Combination
PBS	38	0	36 (95%)	2 (5%)
Private Sector	107	3 (3%)	98 (91%)	6 (6%)

Number of Responses by Cleaning



	n
PBS	38
Private Sector	107

Based on the responses, we can conclude that both PBS and private sector use primarily contractors to perform cleaning tasks.

QUESTION 8

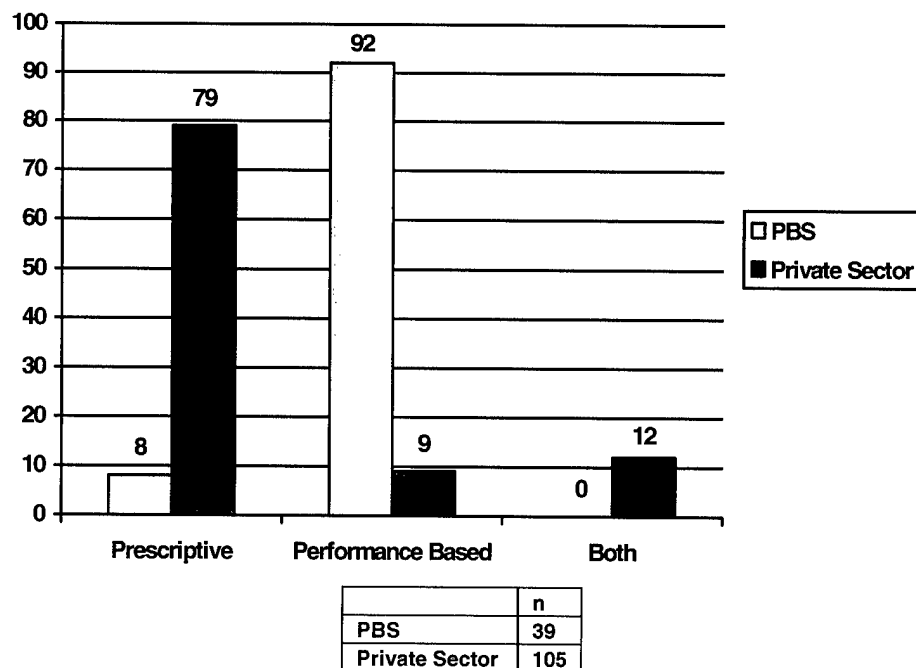
If contractor, indicate type of contract:

- ___ Prescriptive (task frequency)
 ___ Performance based
 ___ Other (specify): _____

The following table summarizes survey responses:

Organization	Number of Responses	Prescriptive	Performance Based	Both
PBS	39	3 (8%)	36 (92%)	
Private Sector	105	83 (79%)	9 (9%)	13 (12%)

Percentage of Responses by Type of Contract



From the survey responses, we can conclude that PBS buildings continue using performance based cleaning contracts while private sector buildings use prescriptive based contracts.

QUESTION 9

If in-house, indicate the total number of in-house cleaning personnel:

Category	Number Of In-House Cleaning Personnel
Full Time	
Part Time	

The following tables summarize survey responses for both the number of full-time and part-time in-house cleaning personnel:

Organization	Number of Responses	Average Number of PT Employees	Average Number of FT Employees	FT/PT Ratio
PBS	10	2	8	4:1
Private Sector	23	4	12	3:1

Note: Based on the examination of the data, in almost all instances, it appears that cleaning crews are either all full-time employees or mostly part-time employees with a few full-time employees, probably supervisors.

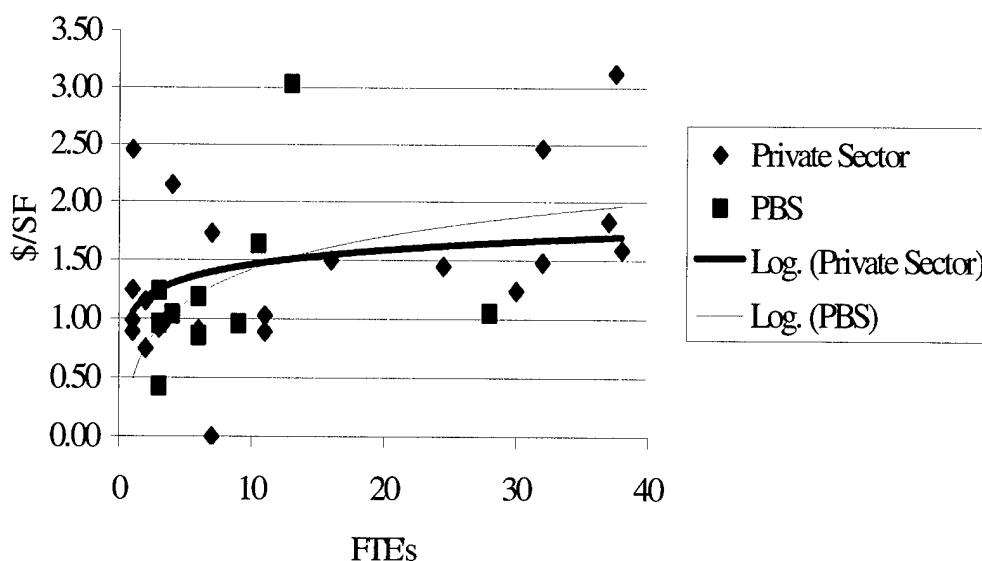
The following table shows the ratio of the usage of full time to part time crews for both PBS and private sector:

Organization	F/T Crew: P/T Crew
PBS	9:1
BOMA	5:1

From the table, we can conclude that both PBS and the private sector are more likely to use full-time crews than part-time crews.

The following chart plots the cleaning crew size (FTEs) and cleaning unit cost for both PBS and private sector buildings:

FTEs vs. Cleaning Costs



Due to the small sample size, it is not possible to determine the cost impact of full time versus part time crew usage.

The following tables show responses for both PBS and the private sector. Private sector costs include cleaning and roads and grounds costs to correspond to PBS's A10 costs.

PBS Survey ID	F/T	P/T	FTEs	Building SF	Cleaning \$	\$/SF	SF per FTE	F/T or P/T
CA0150CC	28		28	1,015,311	1,068,340	1.05	36,261	F/T
CA0191ZZ	9		9	204,338	229,426	1.12	22,704	F/T
CA0273ZZ	4		4	216,512	225,407	1.04	54,128	F/T
IL0209CF	3		3	181,240	77,235	0.43	60,413	F/T
IL0235FC	13		13	183,352	556,633	3.04	14,104	F/T
CA0041ZZ	3		3	703,302	875,511	1.24	234,434	F/T
CA0149ZZ	3		3	67,197	64,769	0.96	22,399	F/T
MA0011ZZ	6		6	134,400	115,501	0.86	22,400	F/T
MA0013ZZ	6		6	556,865	660,417	1.19	92,811	F/T
IL0032ZZ	3	15	10.50	244,905	402,489	1.64	23,324	P/T

BOMA Survey ID	F/T	P/T	FTEs	Building SF	Total cleaning \$	\$/SF	SF per FTE	F/T or P/T
10047	3	1	3.50	101,938	100,082	0.98	29,125	F/T
10110	2	18	11	360,815	319,615	0.89	32,801	P/T
10341	16		16	525,830	787,772	1.50	32,864	F/T
12293	36	3	37.50	453,433	1,421,455	3.13	12,092	F/T
13030	38		38	978,335	1,554,755	1.59	25,746	F/T
1412	7	35	24.50	637,069	923,764	1.45	26,003	P/T
16271	4		4	234,690	503,422	2.15	58,673	F/T
16334	2		2	215,016	247,268	1.15	107,508	F/T
21900	30		30	945,746	1,173,320	1.24	31,525	F/T
27060	32		32	546,785	1,350,000	2.47	17,087	F/T
272	6	2	7	92,933	160,592	1.73	13,276	F/T
28716	1		1	133,282	118,309	0.89	133,282	F/T
29118	7		7	332,608	0	0	47,515	F/T
29473	1		1	791,306	988,283	1.25	791,306	F/T
29592	2		2	600,000	549,237	0.92	300,000	F/T
29808	32		32	1,010,520	1,497,825	1.48	31,579	F/T
29856	2	18	11	369,134	381,691	1.03	33,558	P/T
3895	1		1	175,739	433,173	2.46	175,739	F/T
40088	2		2	215,016	247,268	1.15	107,508	F/T
40437	1	10	6	1,462,488	1,334,968	0.91	243,748	P/T
5399	3		3	398,726	365,508	0.92	132,909	F/T
9317	36	2	37	872,880	1,601,550	1.83	23,591	F/T
9517	1		1	266,467	263,899	0.99	266,467	F/T

QUESTION 10

If in-house, is the cleaning staff predominantly (check one): ___ Union ___ Non-union

The following table summarizes survey responses:

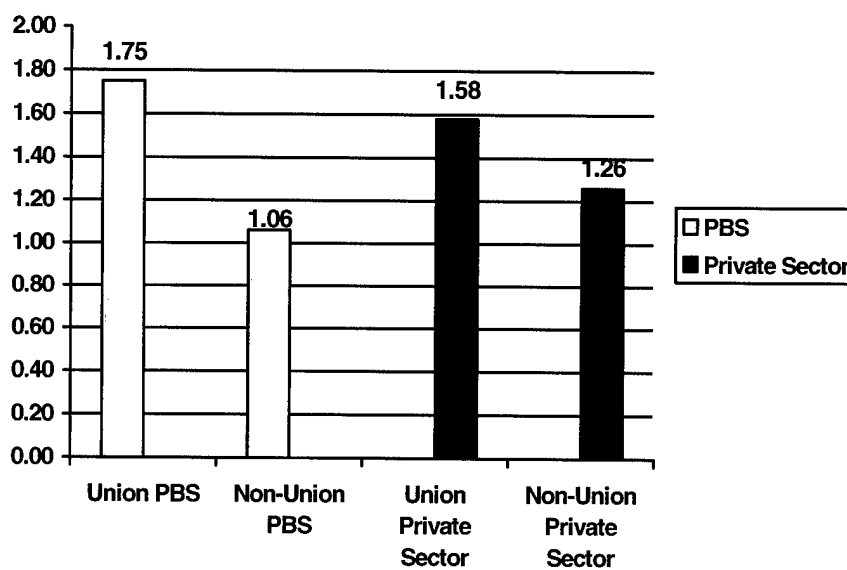
Organization	Number of Responses	Union Staff	Non-union Staff
PBS	11	3	8
Private Sector	19	10	9

The following tables show, based on the number of responses, a comparison between the number of union versus non-union employees by different cities for both PBS and private sector buildings:

Organization	Los Angeles		Atlanta		Chicago		Boston		Dallas	
	Union	Non-union	Union	Non-union	Union	Non-Union	Union	Non-Union	Union	Non-union
PBS	2	4			1	2		2		
Private Sector		1		3	9		1			5

The following chart presents the average cost of union and non-union staff for both PBS and private sector:

Average \$/SF by Staff Type



	n
PBS	11
Private Sector	19

QUESTION 11

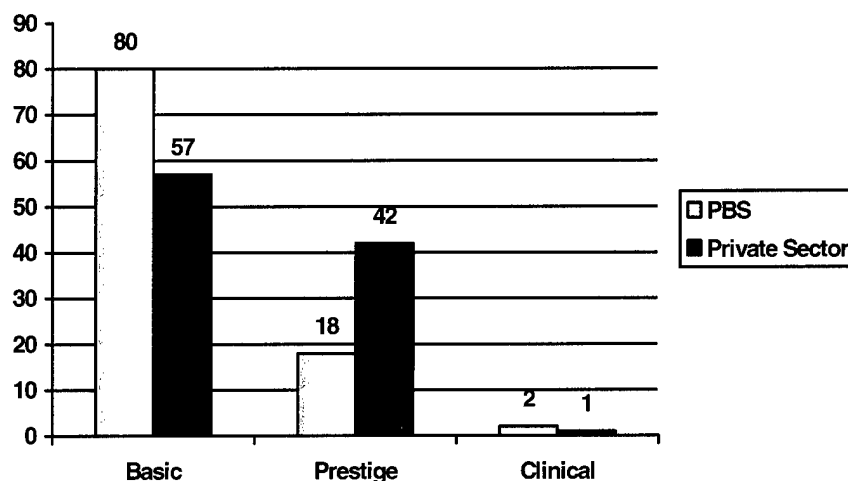
Estimate the percent level of cleaning service provided in each category:

___% Basic ___ % Prestige ___ %Clinical

The following table and chart summarize the survey responses for the cleaning service provided by level for PBS and the private sector.

Organization	Number of Responses	Average % of Basic Service	Average % of Prestige Service	Average % of Clinical Service
PBS	36	80%	18%	2%
Private Sector	88	57%	42%	1%

Average Percentage by Level of Service

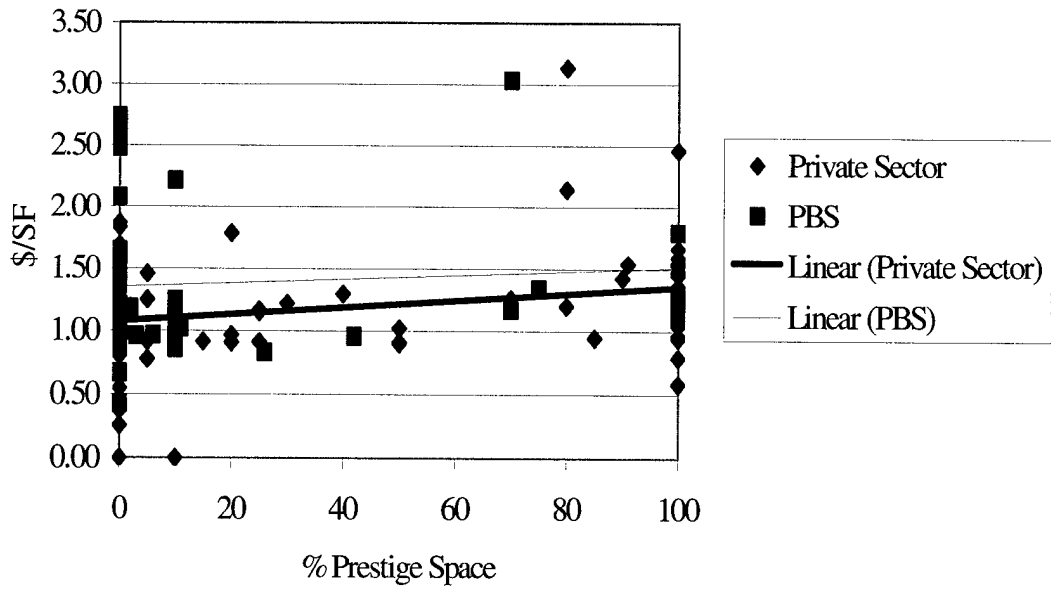


	n
PBS	36
Private Sector	88

We can conclude from the survey responses that, in average, PBS buildings provide more basic service than private sector buildings.

The following chart plots the percent of prestige space vs. unit cleaning cost for both PBS and private sector buildings. Based on this chart, it does not appear that buildings with greater amounts of space requiring prestige cleaning results in higher overall cleaning costs for either PBS or the private sector.

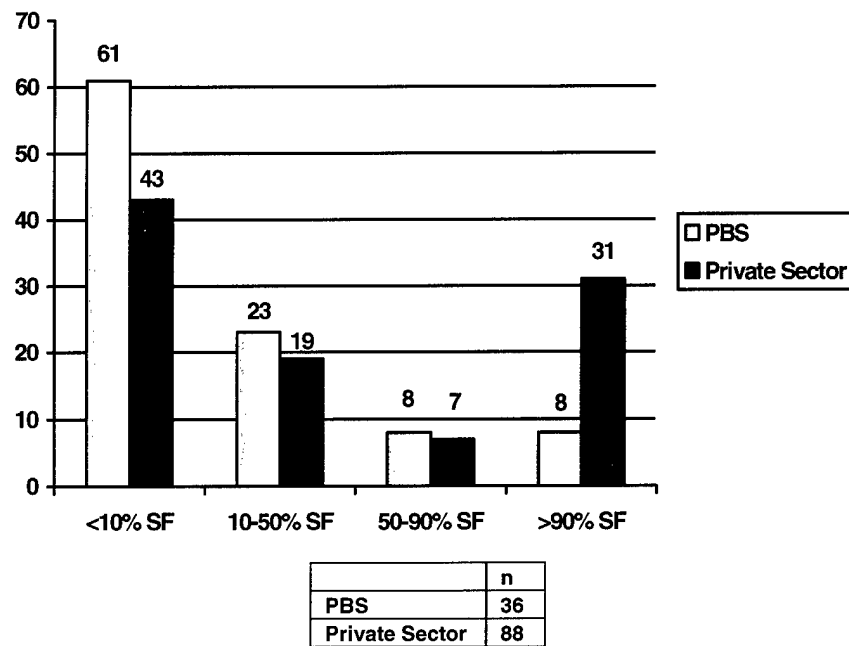
Prestige Space vs. Cleaning Cost



The following table and chart show the distribution of responses for both PBS and private sector surveys to the percent of prestige SF level of cleaning service provided in the different buildings:

Category	Percentage of Responses for PBS	Percentage of Responses for Private Sector
< 10% SF of prestige service	61%	43%
10% - 50% SF of prestige service	23%	19%
50% - 90% SF of prestige service	8%	7%
> 90% SF of prestige service	8%	31%

Percentage of Responses by Category



From the chart above, we can conclude that PBS has a larger percentage of its buildings that receive mostly basic cleaning while a larger portion of buildings in the private sector are cleaned almost entirely at the prestige level.

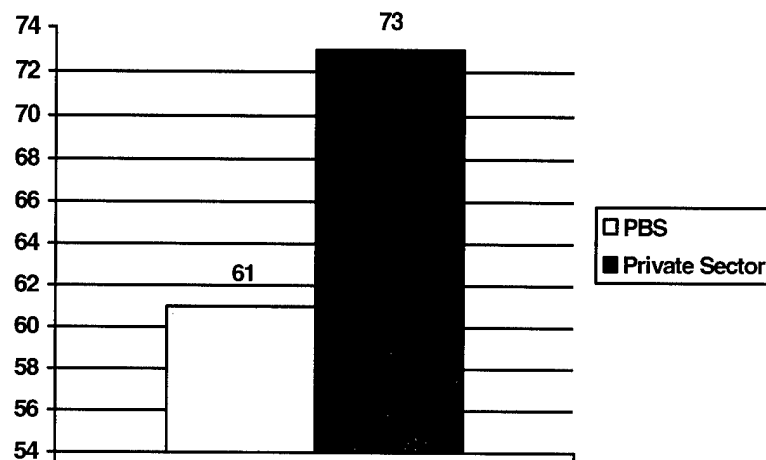
QUESTION 12

Square footage of building carpeted: _____ sq/ft

The following table summarizes survey responses:

Organization	Number of Responses	Average % of Building Carpeted
PBS	30	61%
Private Sector	67	73%

Average Percentage by Building Carpeted

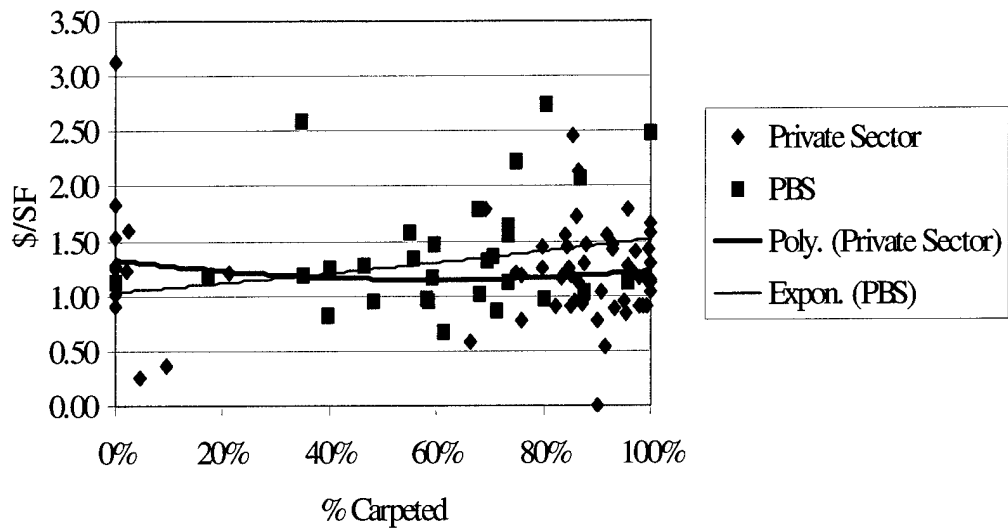


	n
PBS	30
Private Sector	67

Based on the responses, private sector buildings have a somewhat higher percent of building carpeted.

The following chart plots the percent of building carpeted vs. cleaning costs for both PBS and private sector buildings:

Percent Carpeted vs. Cleaning Costs



Note: We excluded data of more than 100% of building carpeted and a negative PBS \$/SF data.

QUESTION 13

Percentage of carpets shampooed: _____%

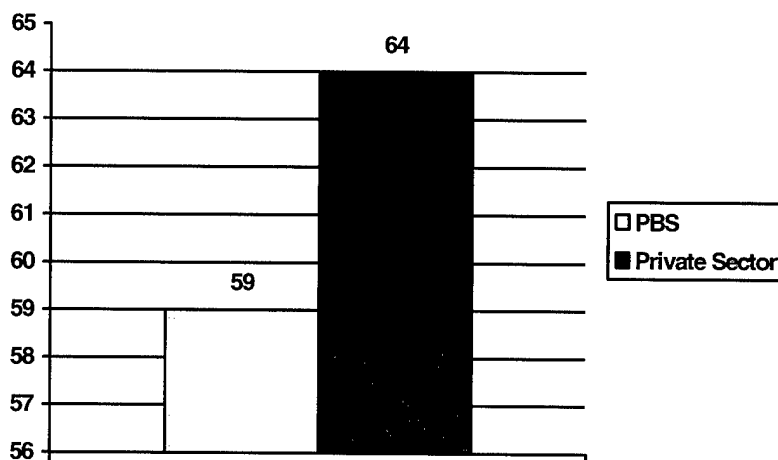
If any, average numbers of shampoos per year: _____%

The following tables summarize survey responses:

Organization	Number of Responses	Average Percent of Carpets Shampooed
PBS	29	59%
Private Sector	72	64%

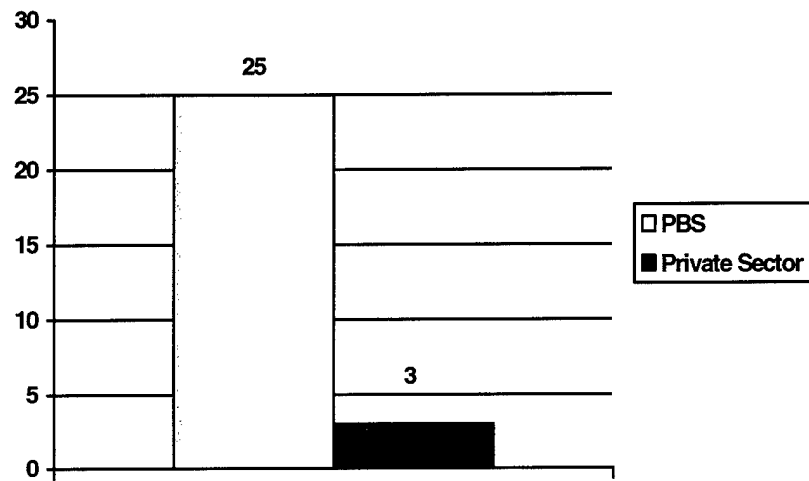
Organization	Number of Responses	Average Number of Shampoos per Year
PBS	19	25
Private Sector	65	3

Average Percentage of Carpets Shampooed



	n
PBS	29
Private Sector	72

Average Number of Shampoos per Year



	n
PBS	19
Private Sector	65

Note: There is some concern about the validity of the data and follow-up is needed.

QUESTION 14

Indicate the frequency of tasks performed by cleaning personnel (check all that apply):

Furniture Cleaning

Window Cleaning

Mop/Spray Buff

Vacuuming

Trash Removal

Recycling Removal

Hazmat Removal

Restrooms

Other Tasks

Other Services

We have combined the different responses into the following five groups:

Frequency	Responses
Not Done	Not Done
Annually	3-4 Times per Year Twice per Year Once per Year
Monthly	1-3 Times per Month Once per Week
Weekly	Twice per Week 3-4 Times per Week
Daily	Multiple Times Daily Once per Day

The following table indicates the dominant value by tasks performed by both PBS and private sector cleaning personnel (we have added the corresponding percent response):

Tasks	PBS	Private Sector	Variation
Dust Desks/Shelves	Daily (39%)	Daily (54%)	PBS moderately less
Clean Furniture	Not Done (34%)	Daily (40%)	PBS significantly less
Clean Computer Monitors	Not Done (73%)	Not Done (43%)	PBS significantly less
Clean windows, blinds, shades, covers	Annually (66%)	Annually (49%)	Consistent
Clean interior windows	Annually (76%)	Annually (86%)	PBS moderately less
Clean exterior windows	Annually (71%)	Annually (80%)	PBS moderately less
Mop/spray high traffic floors	Daily (58%)	Daily (49%)	Consistent
Mop/spray low traffic floors	Monthly (34%)	Monthly (46%)	Consistent
Vacuuming high traffic carpet	Daily (74%)	Daily (94%)	PBS moderately less
Vacuuming low traffic carpet	Daily (37%)	Daily (81%)	PBS significantly less
Full vacuuming	Daily (34%)	Daily (79%)	PBS significantly less
Trash removal from interior spaces	Daily (95%)	Daily (99%)	Consistent
Trash removal from building site	Weekly (37%)	Daily (64%)	PBS significantly less
Recycling removal from interior spaces	Daily (47%)	Daily (56%)	Consistent
Recycling removal from building site	Monthly (61%)	Daily (36%)	PBS moderately less
Hazmat removal from interior spaces	Not Done (84%)	Not Done (71%)	Consistent
Hazmat removal from building site	Not Done (81%)	Not Done (64%)	Consistent
Restock restrooms supplies, empty trash, tidy area	Daily (95%)	Daily (98%)	Consistent
Clean/sanitize commodes, urinals, and washbasins	Daily (100%)	Daily (97%)	Consistent
Clean air duct grilles/diffusers	Annually (61%)	Annually (47%)	Consistent
Remove/apply finishes to hard floor	Annually (77%)	Annually (50%)	PBS moderately more
Clean kitchen/coffee areas	Daily (44%)	Daily (64%)	PBS moderately less

Tasks	PBS	Private Sector	Variation
Restock coffee and other vending machines	Not Done (82%)	Not Done (79%)	Consistent
Provide bottled water service	Not Done (92%)	Not Done (83%)	Consistent
Setup/cleanup for parties and special events	Not Done (68%)	Not Done (61%)	Consistent
Moving services	Not Done (83%)	Not Done (70%)	Consistent
On-call assistance	Not Done (58%)	Not Done (55%)	Consistent
Pest control	Monthly (68%)	Monthly (49%)	PBS moderately more
Signage	Not Done (70%)	Not Done (66%)	Consistent

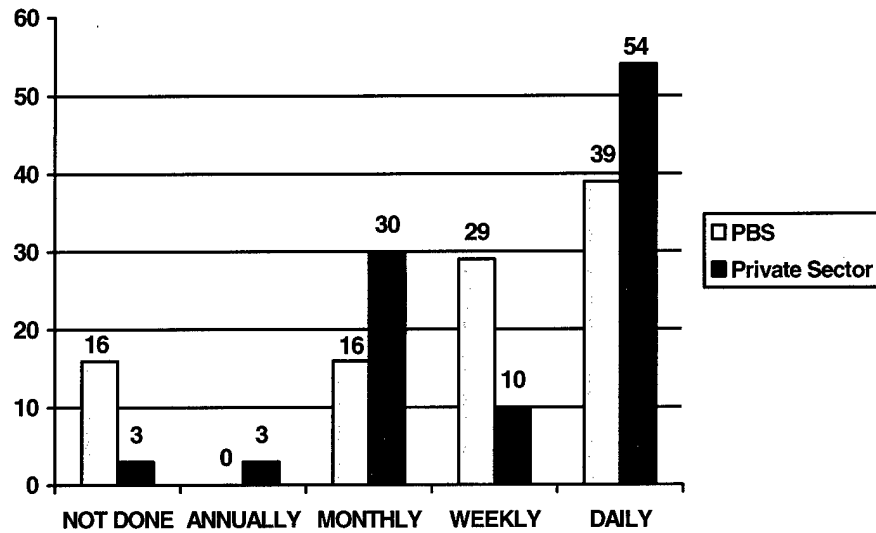
From the table above we can examine the level of service variation between PBS and private sector buildings:

- ◆ The tasks performed with similar levels of service between PBS and private sector include: clean windows, blinds, shades, covers, mop/spray high and low traffic floors, recycling removal from interior and exterior spaces, hazmat removal from interior spaces and building site, restock restrooms supplies, empty trash, tidy area, clean/sanitize commodes, urinals, and washbasins, clean air duct grilles/diffusers. Other services like: restock coffee and other vending machines, provide bottled water service, setup/cleanup for parties and special events, moving services and on-call assistance and signage.
- ◆ The tasks performed moderately less by PBS are: dust desks/shelves, vacuuming high traffic carpet, recycling removal from building site and clean kitchen/coffee areas.
- ◆ The tasks with greatest disparities between PBS and private sector are: clean Furniture, clean computer monitors, vacuuming low traffic carpet, full vacuuming and trash removal from building site.
- ◆ The two areas where PBS level of service exceeds that of private sector are: pest control and remove/apply finishes to hard floor.

Furniture Cleaning:

A. Dust desks/shelves

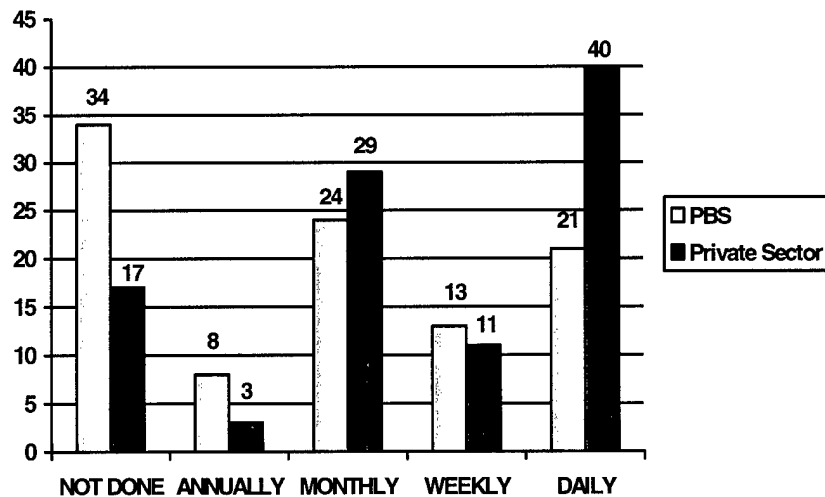
Percentage of Responses by Frequency



	n
PBS	38
Private Sector	101

B. Clean furniture

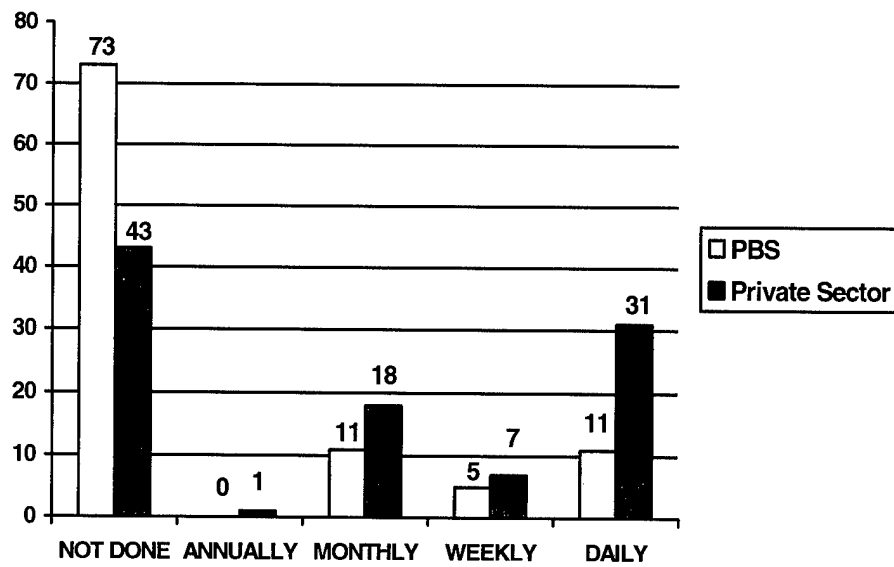
Percentage of Responses by Frequency



	n
PBS	38
Private Sector	99

C. Clean computer monitors

Percentage of Responses by Frequency

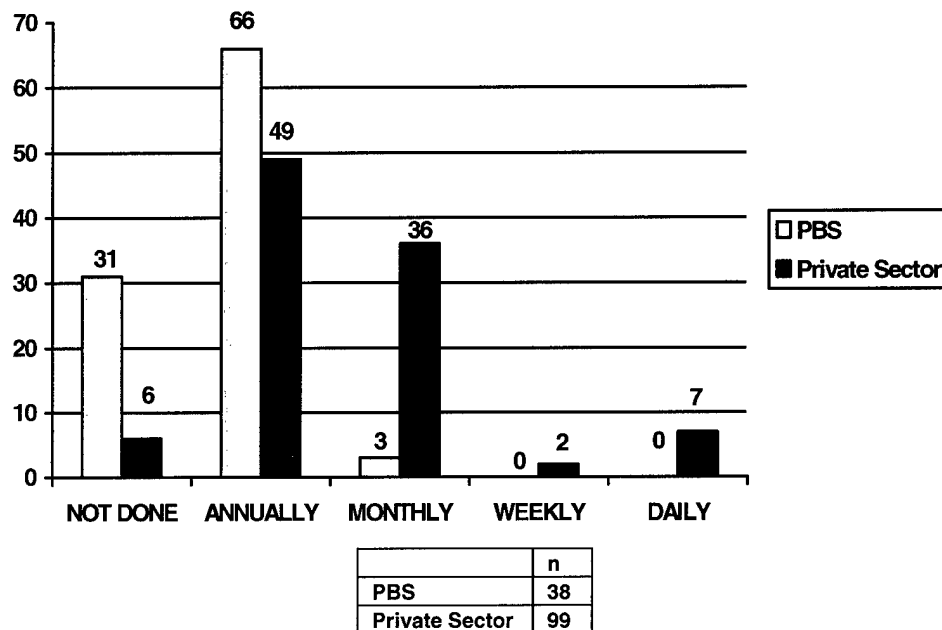


	n
PBS	37
Private Sector	100

Window Cleaning:

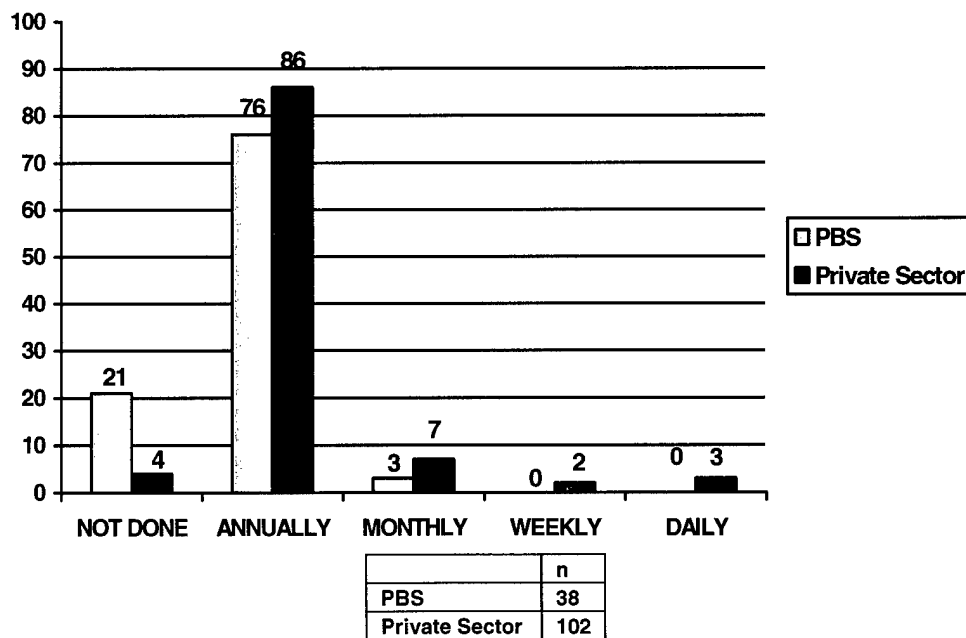
D. Clean window blinds, shades, covers

Percentage of Responses by Frequency



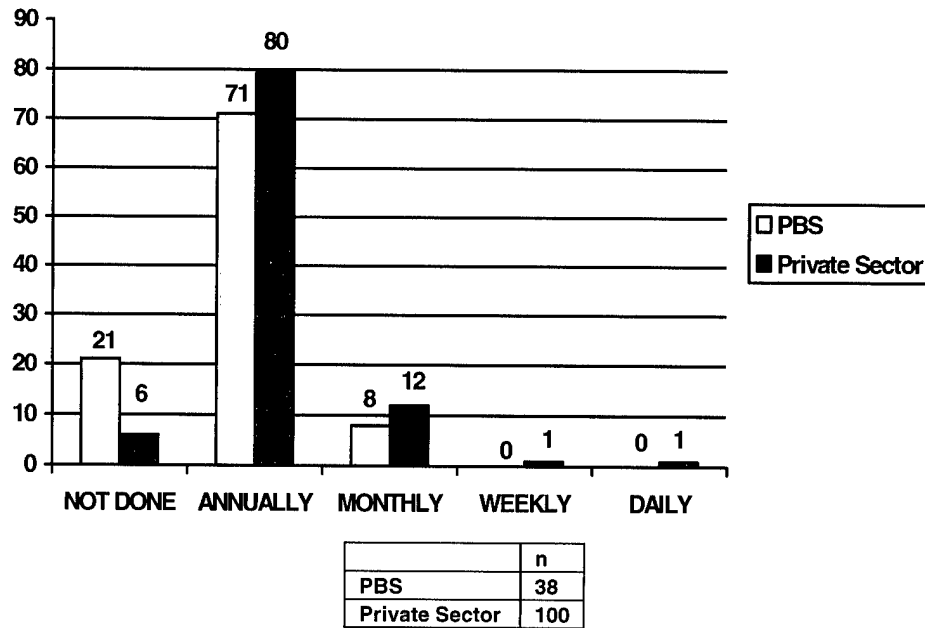
E. Clean interior windows

Percentage of Responses by Frequency



F. Clean exterior windows

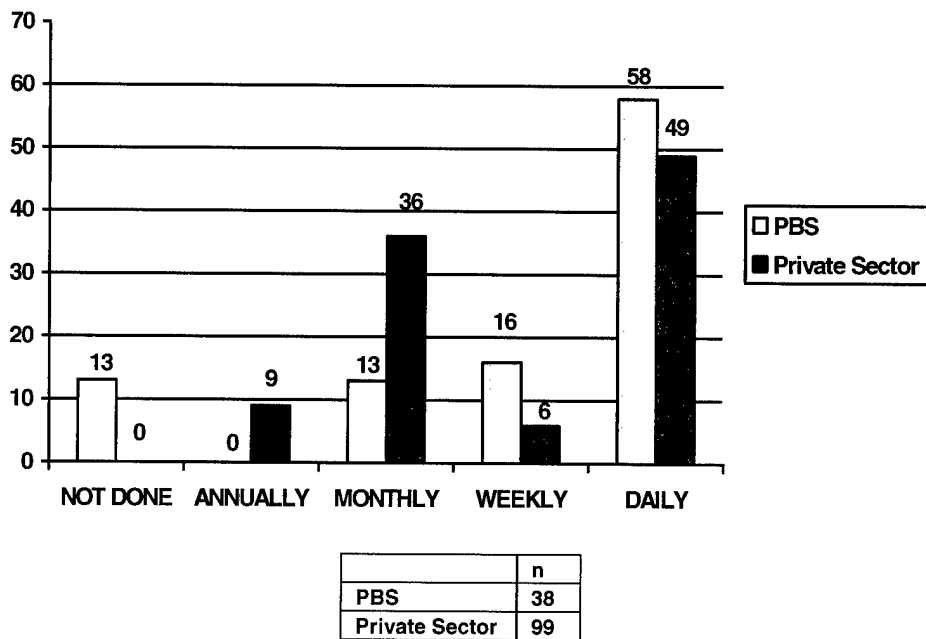
Percentage of Responses by Frequency



Mop/Spray Buff:

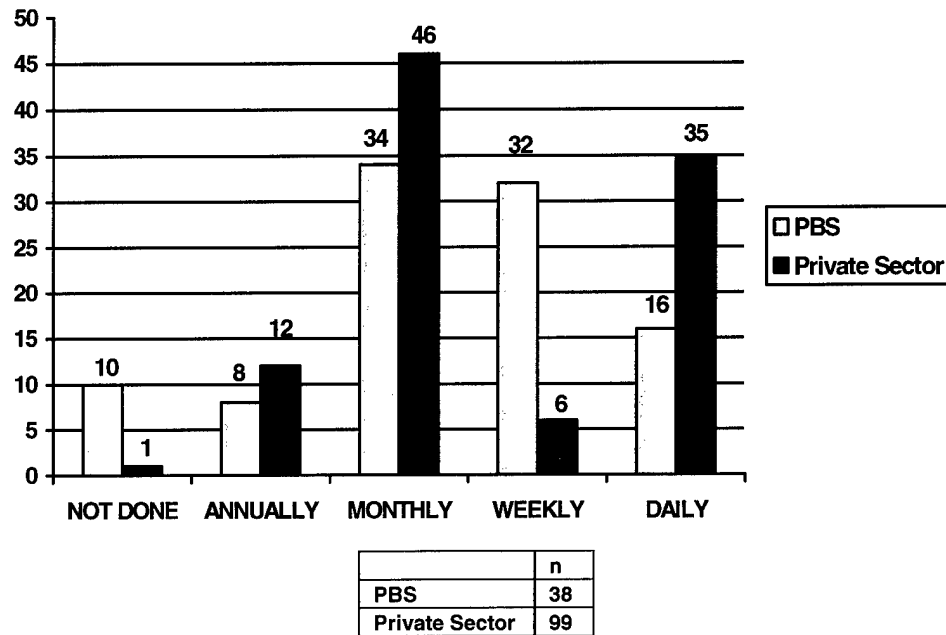
G. High traffic floors

Percentage of Responses by Frequency



H. Low traffic floors

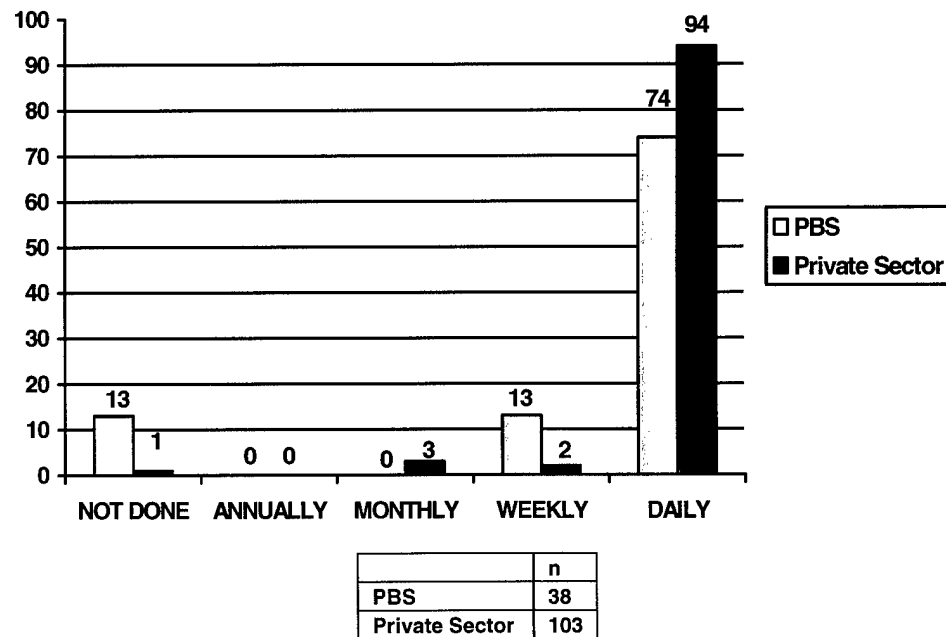
Percentage of Responses by Frequency



Vacuuming:

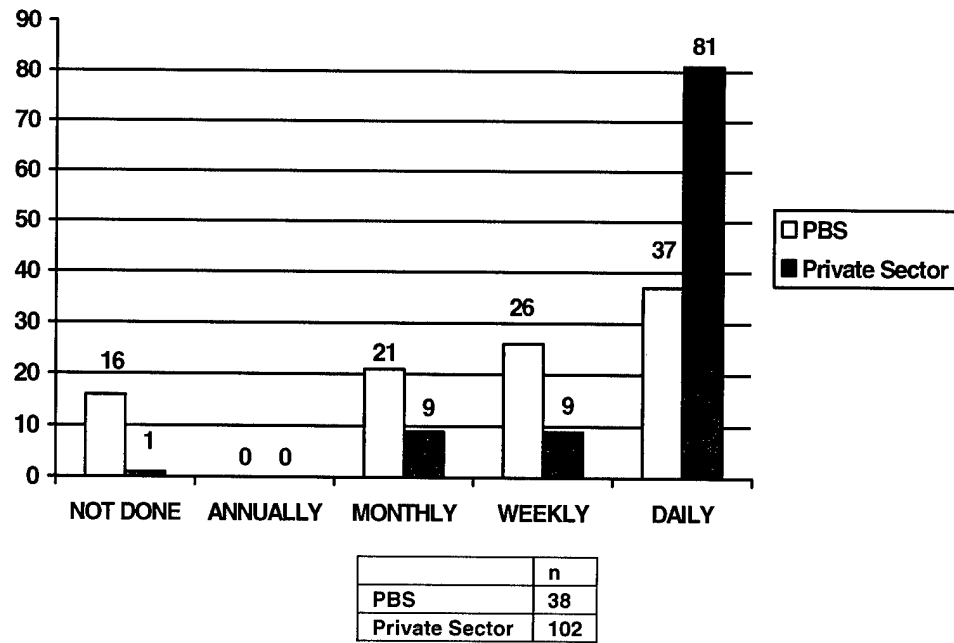
I. High traffic carpet

Percentage of Responses by Frequency



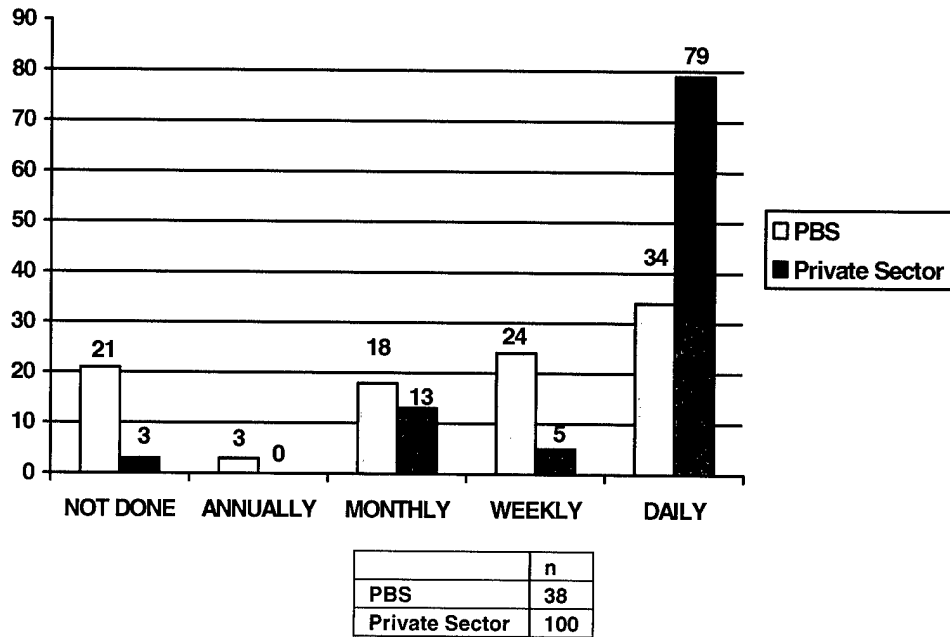
J. Low traffic carpet

Percentage of Responses by Frequency



K. Full vacuuming

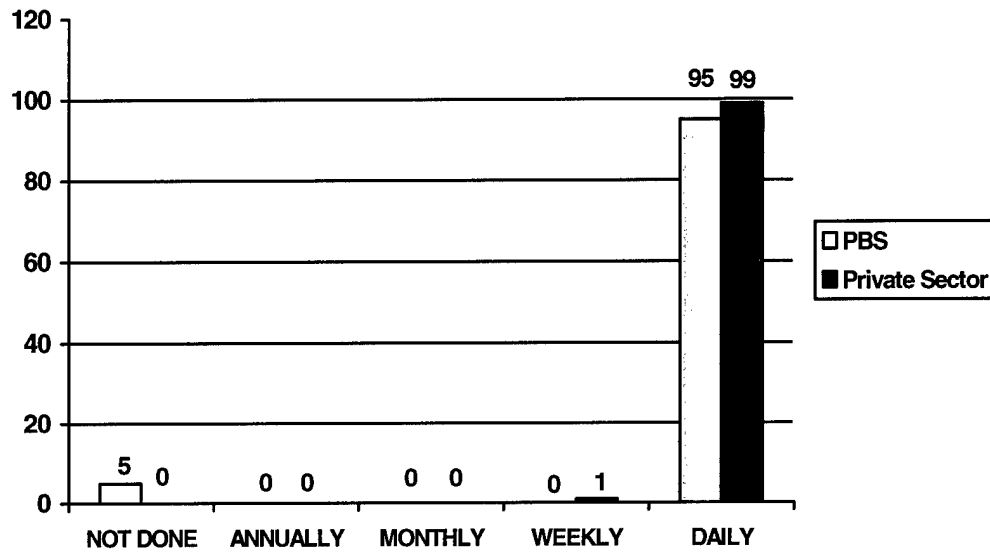
Percentage of Responses by Frequency



Trash Removal:

L. From interior spaces

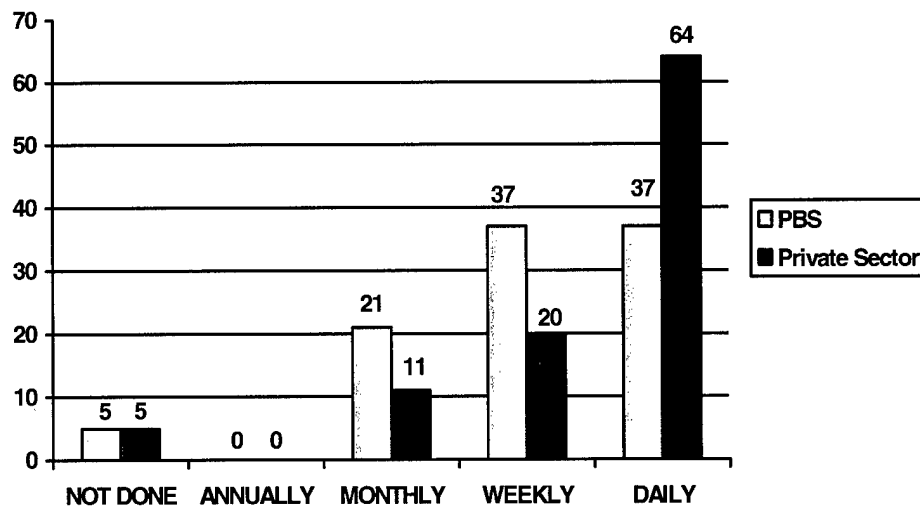
Percentage of Responses by Frequency



	n
PBS	38
Private Sector	102

M. From building site

Percentage of Responses by Frequency

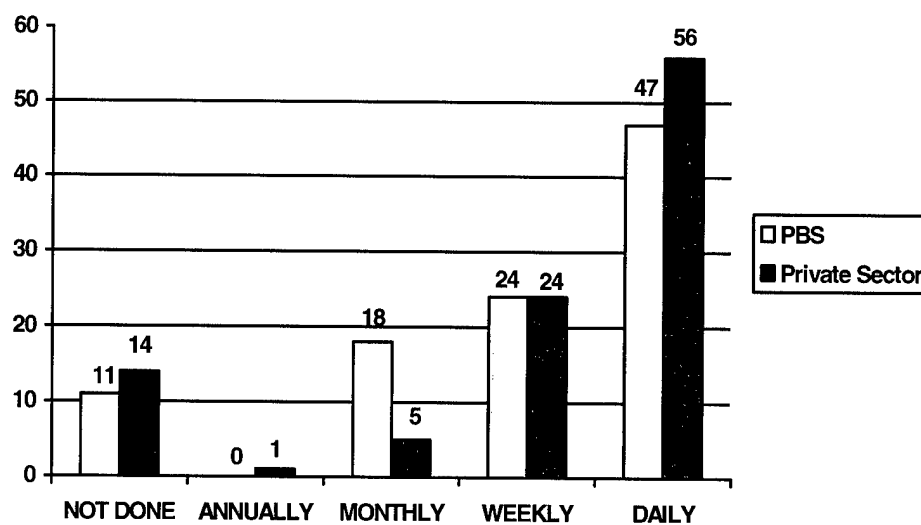


	n
PBS	38
Private Sector	103

Recycling Removal:

N. From interior spaces

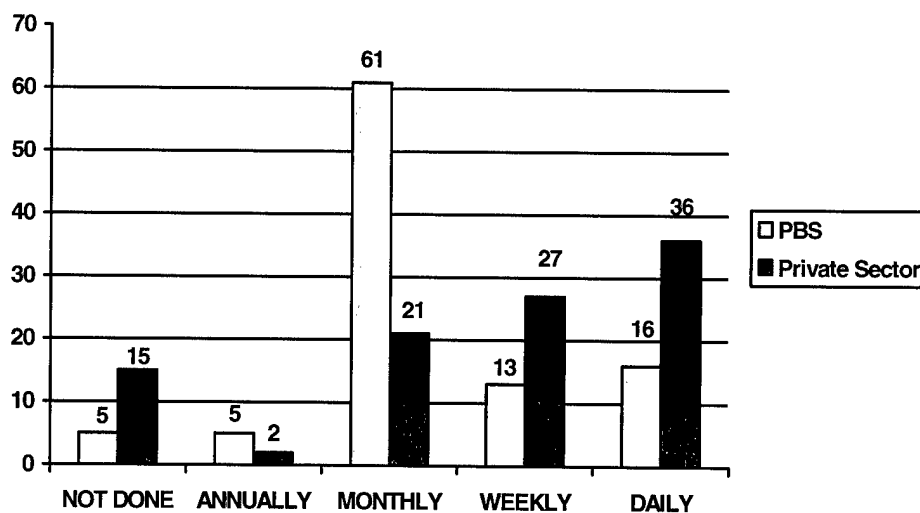
Percentage of Responses by Frequency



	n
PBS	38
Private Sector	101

O. From building site

Percentage of Responses by Frequency

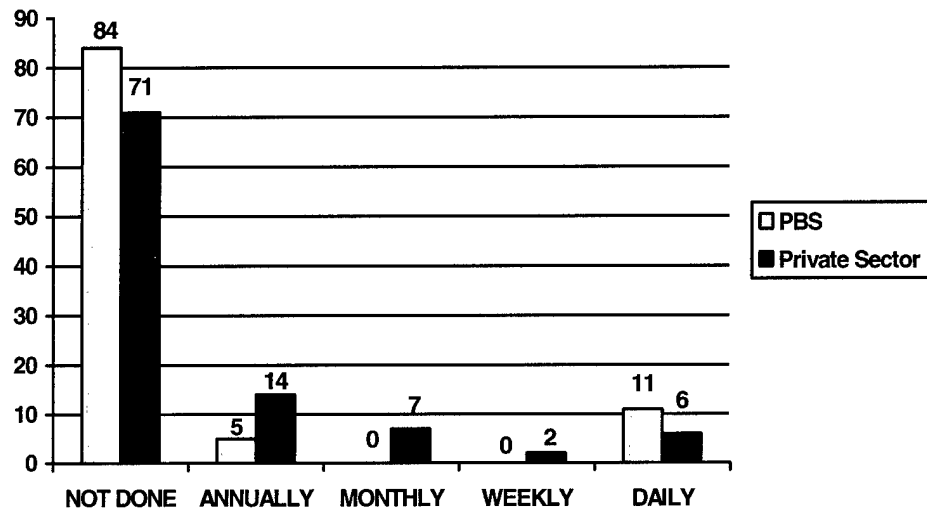


	n
PBS	38
Private Sector	103

Hazmat Removal:

P. From interior spaces

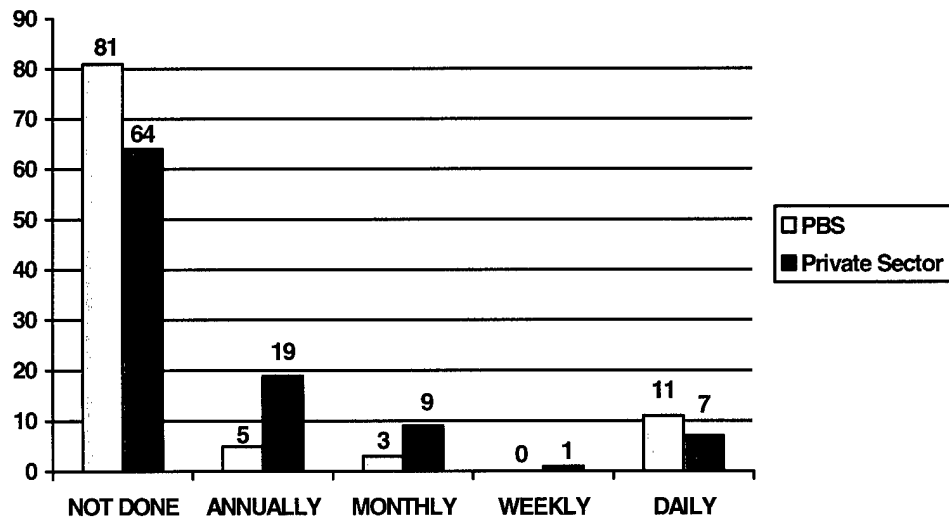
Percentage of Responses by Frequency



	n
PBS	37
Private Sector	86

Q. From building site

Percentage of Responses by Frequency

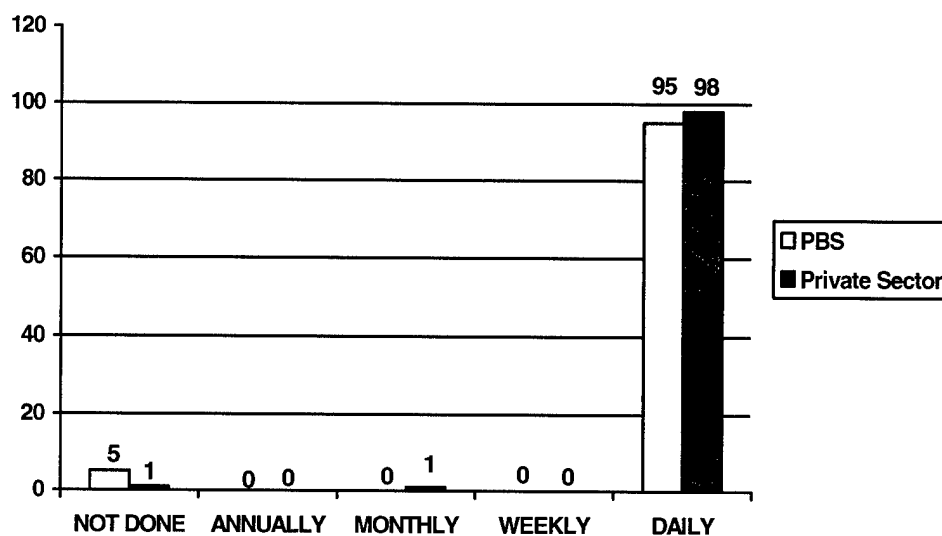


	n
PBS	37
Private Sector	87

Restrooms:

R. Restock restrooms supplies, empty trash, and tidy area

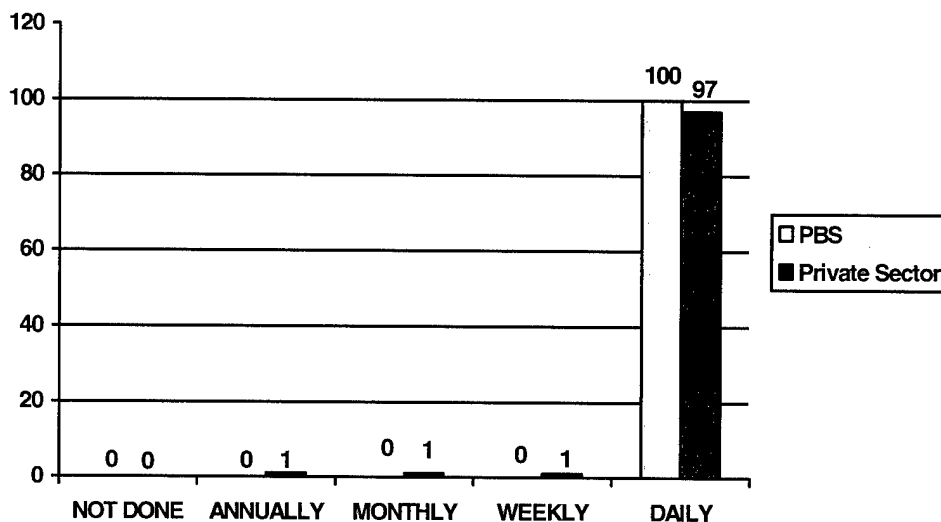
Percentage of Responses by Frequency



	n
PBS	38
Private Sector	103

S. Clean/sanitize commodes, urinals and washbasins

Percentage of Responses by Frequency

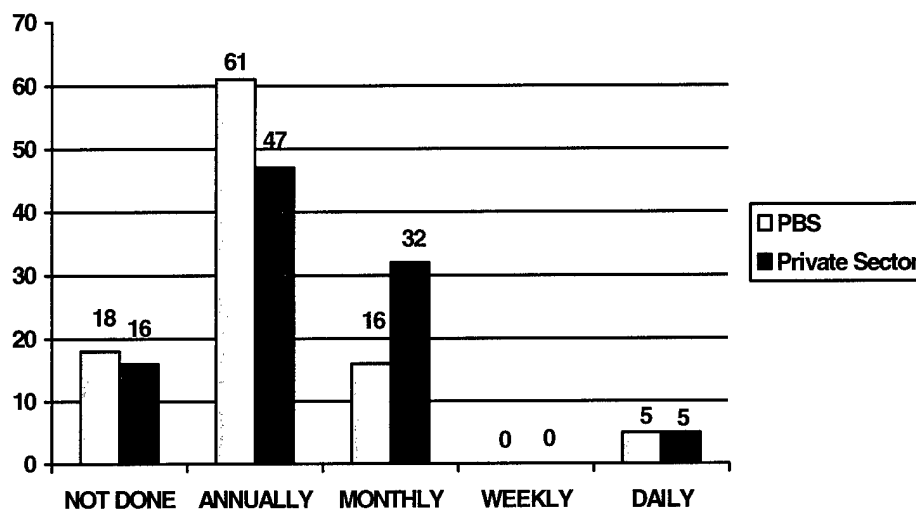


	n
PBS	38
Private Sector	103

Other Tasks

T. Clean air duct grilles/diffusers

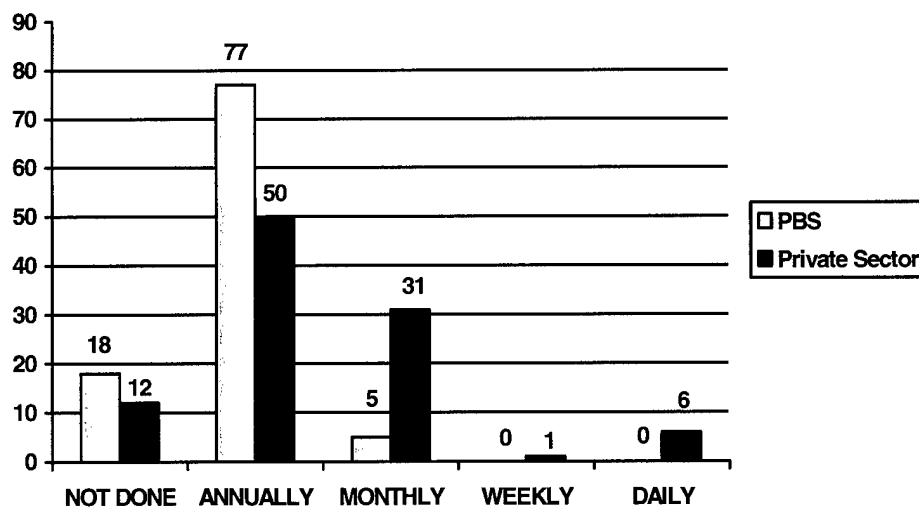
Percentage of Responses by Frequency



	n
PBS	38
Private Sector	98

U. Remove/apply finishes to hard floor

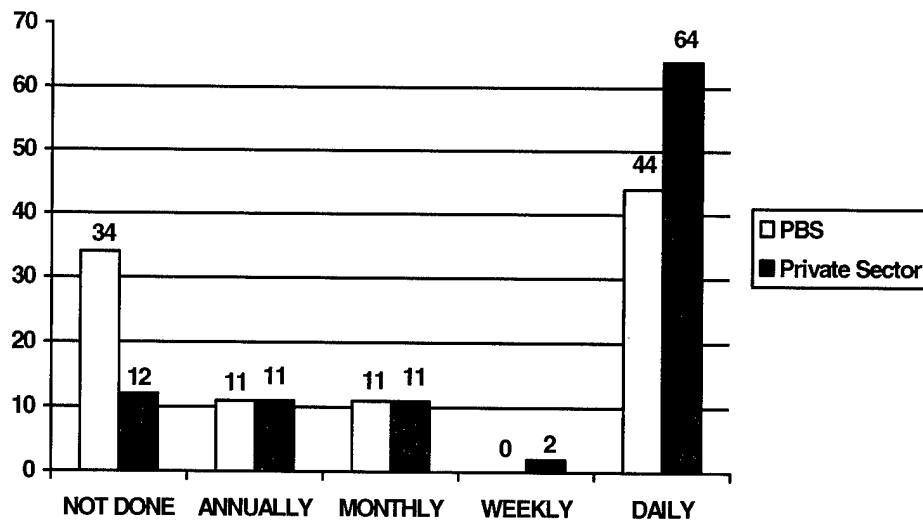
Percentage of Responses by Frequency



	n
PBS	38
Private Sector	99

V. Clean kitchen/coffee areas

Percentage of Responses by Frequency

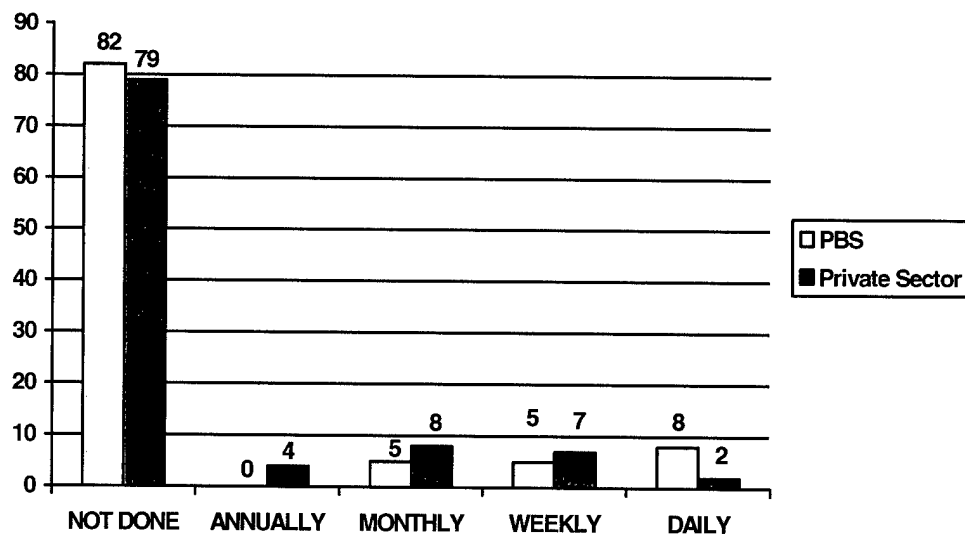


	n
PBS	38
Private Sector	101

Other Services:

W. Restock coffee and other vending machines

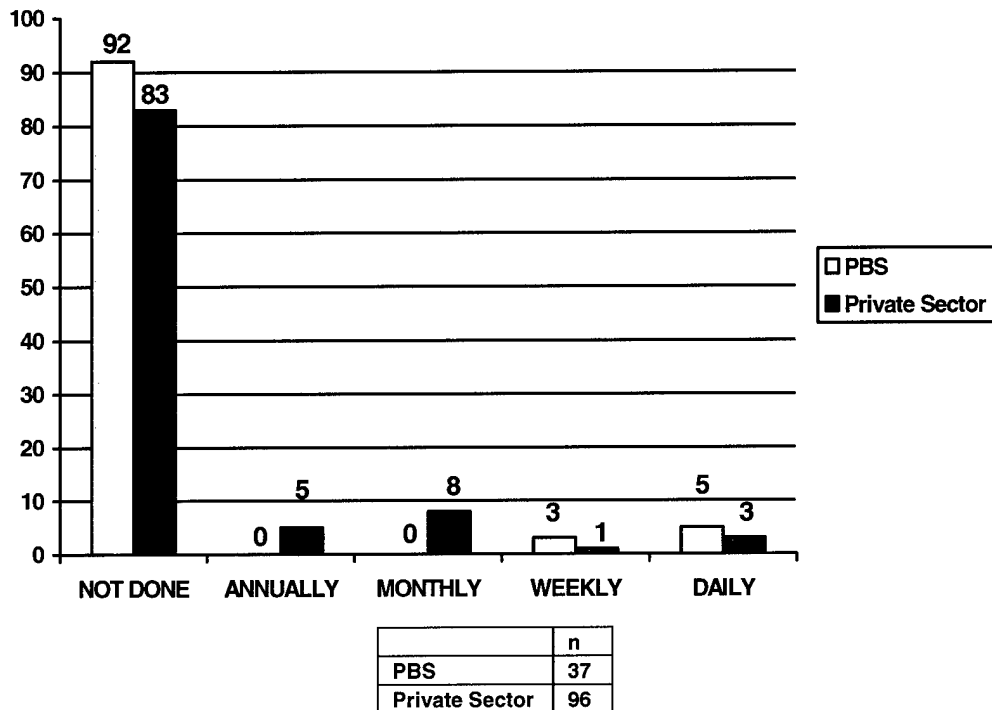
Percentage of Responses by Frequency



	n
PBS	38
Private Sector	96

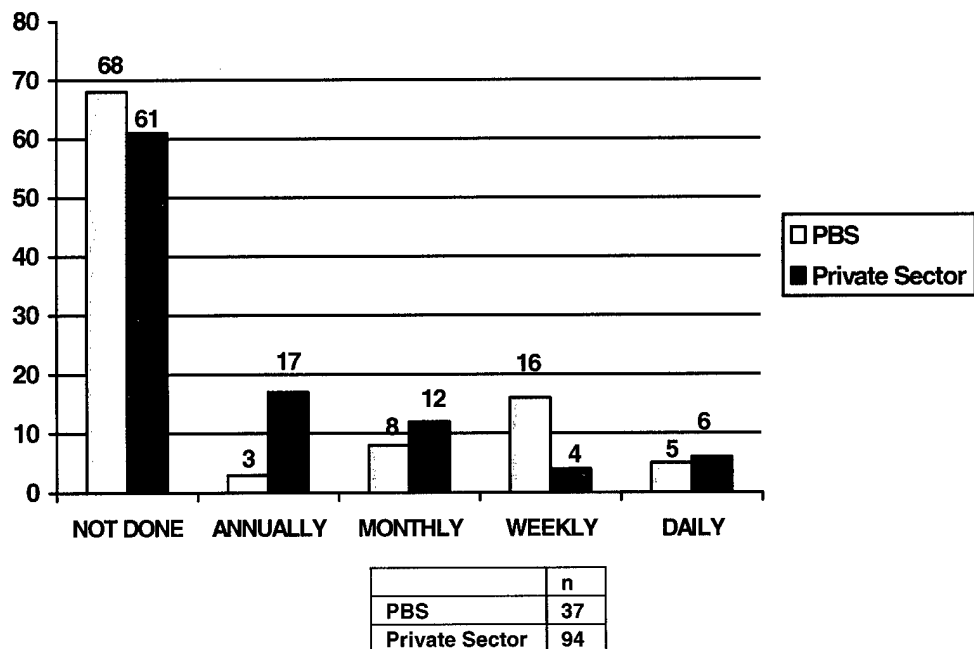
X. Provide bottled water service

Percentage of Responses by Frequency



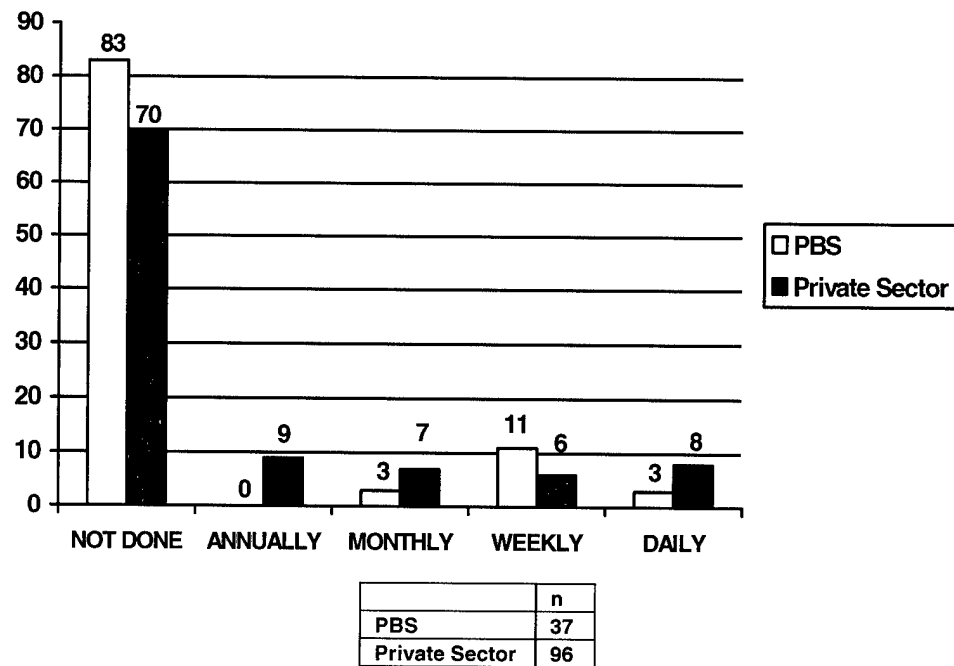
Y. Setup/cleanup for parties and special events

Percentage of Responses by Frequency



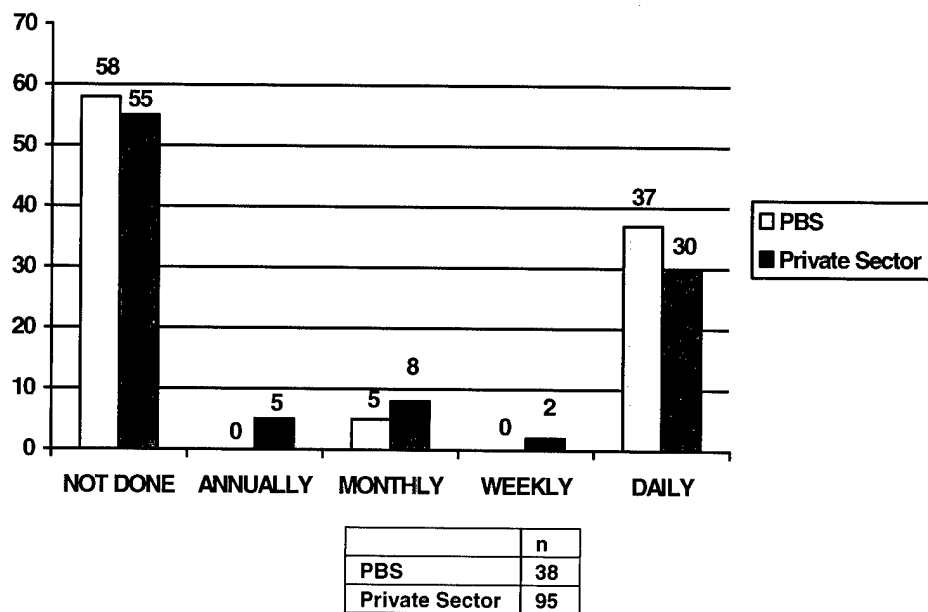
Z. Moving services

Percentage of Responses by Frequency



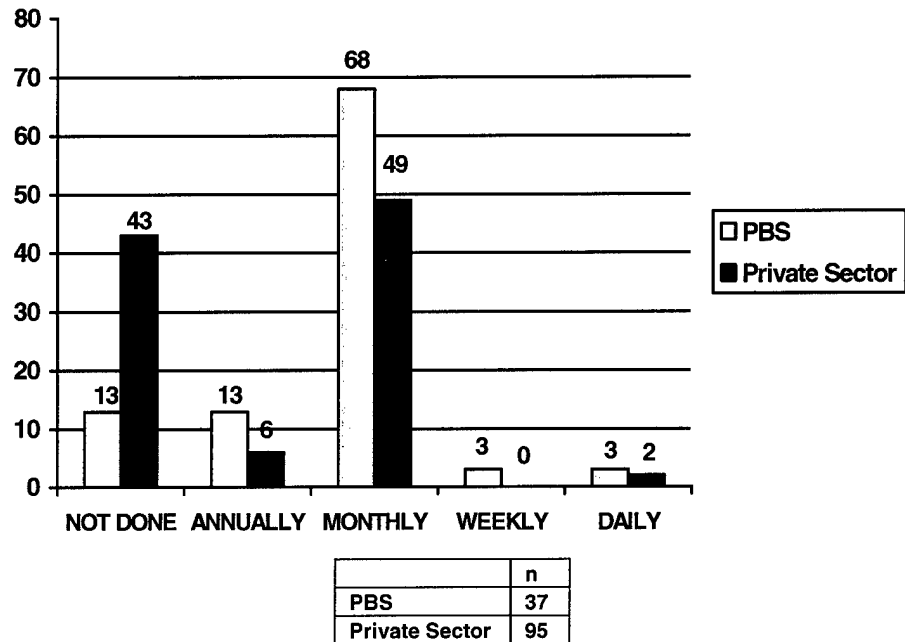
AA. On-call assistance

Percentage of Responses by Frequency



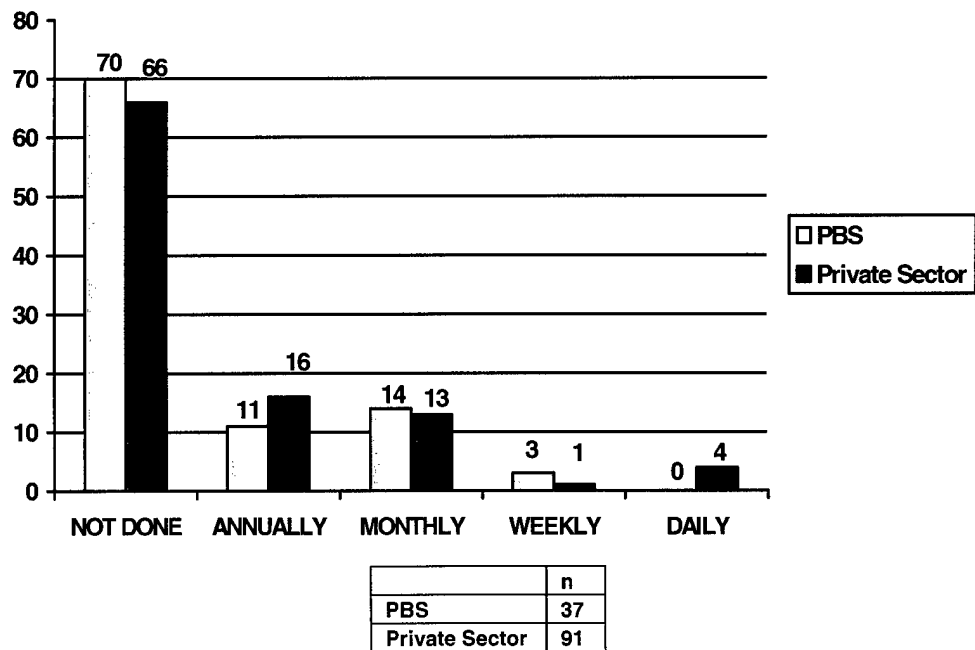
BB. Pest control

Percentage of Responses by Frequency



CC. Signage

Percentage of Responses by Frequency



The following tables summarizes survey responses for both PBS and the private sector:

PBS Response Number	Building/Survey Number	SF	Cleaning \$	Cleaning \$/SF	Cleaning Performed By	Type of Contract	FTEs	Staff Type	% Prestige Service
1	CA0150CC	1,015,311	1,068,340	1.05	contractor	performance	28	non-union	0%
2	CA0168ZZ	518,951	497,748	0.96	contractor	performance			3%
3	CA0191ZZ	204,338	229,426	1.12	contractor	performance	9	non-union	0%
4	CA0224ZZ	206,979	459,020	2.22	contractor	performance			10%
5	CA0273ZZ	216,512	225,407	1.04	contractor	performance	4	non-union	0%
6	CA0283CC	743,241	877,319	1.18	contractor	performance		non-union	2%
7	GA0007ZZ	328,275	218,335	0.67	contractor	performance			0%
8	GA0008ZZ	158,339	151,384	0.96	contractor	performance			42%
9	GA0087AD	793,029	1,239,006	1.56	contractor	performance			0%
10	GA0121ZZ	991,986	1,012,741	1.02	contractor	performance			11%
11	GA0125ZZ	50,453	41,925	0.83	contractor	performance			26%
12	GA0501AA	2,110	5,482	2.60	contractor	performance			0%
13	IL0054ZZ	559,222	792,946	1.42	contractor	performance			0%
14	IL0205ZZ	1,259,381	1,686,192	1.34	contractor	performance			75%
15	IL0209CF	181,240	77,235	0.43	contractor	performance	3	non-union	0%
16	IL0235FC	183,352	556,633	3.04	combination	performance	13	union	70%
17	ILO236FC	1,116,972	1,305,784	1.17	contractor	performance			70%
18	MA0050ZZ	719,126	1,136,253	1.58	contractor	performance			
19	MA0131ZZ	824,892	1,125,490	1.36	contractor	performance			0%
20	MA0138ZZ	5,745	15,740	2.74	contractor	performance			0%
21	MA0153ZZ	645,989	957,943	1.48	contractor	performance			0%
22	CA0041ZZ	703,302	875,511	1.24	combination	performance	3	union	10%
23	CA0149ZZ	67,197	64,769	0.96		performance	3	union	10%
24	CA0185ZZ	13,810	-55,247	-4.00	contractor	performance			0%
25	CA9551RR	145,550	184,027	1.26	contractor	performance			100%

PBS Response Number	Building/Survey Number	SF	Cleaning \$	Cleaning \$/SF	Cleaning Performed By	Type of Contract	FTEs	Staff Type	% Prestige Service
26	MA0011ZZ	134,400	115,501	0.86	contractor	performance	6	non-union	10%
27	MA0013ZZ	556,865	660,417	1.19	contractor	performance	6	non-union	10%
28	MA0076ZZ	3,249	5,836	1.80	contractor	performance			100%
29	MA0135ZZ	7,571	15,763	2.08	contractor	performance			0%
30	MA0158ZZ	26,700	39,237	1.47	contractor	performance			
31	IL0032ZZ	244,905	402,489	1.64	contractor	performance	10.50	non-union	0%
32	IL0231ZZ	31,943	-97,517	-3.05	contractor	performance			0%
33	IL0300ZZ	1,290	3,217	2.49					
34	IL0303ZZ	705,826	791,872	1.12	contractor	performance			100%
35	TX0057ZZ	157,949	206,943	1.31	contractor	prescriptive			
36	TX0058DA	329,051	291,635	0.89	contractor	performance			0%
37	TX0200ZZ	6,230	15,472	2.48	contractor	performance			0%
38	TX0284DA	904,847	872,316	0.96	contractor	performance			6%
39	TX0292ZZ	187,865	211,565	1.13	contractor	prescriptive			0%
40	TX0302ZZ	324,970	383,011	1.18	contractor	prescriptive			0%

BOMA Response Number	Building/Survey Number	SF	Cleaning \$	Rds & Grds \$	Total Cleaning	Cleaning \$/SF	Cleaning Performed By	Type of Contract	FTEs	Staff Type	% Prestige Service
1	10047	101,938	59,590	40,492	100,082	0.98	contractor	prescriptive	3.50		1%
2	10110	360,815	260,799	58,816	319,615	0.89	contractor	other	11		
3	10341	525,830	776,361	11,411	787,772	1.50	contractor	performance	16	union	0%
4	10517	394,324	316,234	79,640	395,874	1.00	contractor	prescriptive			10%
5	12293	453,433	1,395,485	25,970	1,421,455	3.13	in-house		37.50	union	80%
6	12443	343,602	270,498	57,666	328,164	0.96	contractor	prescriptive			100%
7	1251	690,341	535,832	0	535,832	0.78	contractor	prescriptive			5%
8	12839	604,428	548,078	23,344	571,422	0.95	contractor	both			85%
9	12840	369,983	371,216	21,332	392,548	1.06	contractor	performance			10%
10	13030	978,335	1,554,755	0	1,554,755	1.59	contractor	both	38	union	100%
11	13050	634,381	470,224	87,834	558,058	0.88	contractor	prescriptive			0%
12	13139	252,870	310,482	78,568	389,050	1.54	contractor	prescriptive			100%
13	13298	252,180	211,517	70,930	282,447	1.12	contractor	prescriptive			0%
14	13505	151,296	95,252	60,963	156,215	1.03	contractor	prescriptive			
15	13534	79,800	74,697	28,553	103,250	1.29	contractor	prescriptive			40%
16	13670	167,756	160,415	34,631	195,046	1.16	contractor	other			0%
17	13852	390,721	289,125	74,355	363,480	0.93	contractor	prescriptive			5%
18	14097	134,490	125,368	4,969	130,337	0.97	contractor	prescriptive			20%
19	1412	637,069	882,911	40,853	923,764	1.45	contractor	prescriptive	24.50	union	
20	15818	525,422	419,989	128,883	548,872	1.04	contractor	prescriptive			
21	16271	234,690	324,797	178,625	503,422	2.15	contractor	prescriptive	4	non-union	80%
22	16334	215,016	247,268	0	247,268	1.15	contractor	prescriptive	2	non-union	25%
23	16423	418,604	327,313	21,729	349,042	0.83	contractor	prescriptive			
24	17651	173,492	16,674	107,985	124,659	0.72					
25	17690	180,800	215,226	11,981	227,207	1.26	contractor	prescriptive			
26	17753	1,411,254	1,194,441	71,324	1,265,765	0.90	contractor	prescriptive			0%
27	18131	715,051	956,350	79,557	1,035,907	1.45	contractor	prescriptive			100%

BOMA Response Number	Building/Survey Number	SF	Cleaning \$	Rds & Grds \$	Total Cleaning	Cleaning \$/SF	Cleaning Performed By	Type of Contract	FTEs	Staff Type	% Prestige Service
28	18157	317,052	381,391	13,641	395,032	1.25	contractor	prescriptive			0%
29	18464	96,717	75,524	13,704	89,228	0.92	contractor	prescriptive			0%
30	18811	249,288	323,321	15,311	338,632	1.36	contractor	prescriptive			100%
31	19667	1,572,454	1,157,802	5,026	1,162,828	0.74	contractor	prescriptive			
32	20035	251,943	250,610	118,106	368,716	1.46	contractor	prescriptive			100%
33	20266	135,572	161,041	53,830	214,871	1.58	contractor	prescriptive			0%
34	20300	293,003	274,787	96,946	371,733	1.27	contractor	prescriptive			0%
35	20538	622,487	943,132	28,529	971,661	1.56	contractor	other			0%
36	20596	378,538	264,277	205,060	469,337	1.24	contractor	prescriptive		non-union	100%
37	21068	211,352	175,547	78,077	253,624	1.20	contractor	prescriptive			80%
38	21677	531,148	791,130	31,953	823,083	1.55	contractor	prescriptive			100%
39	21703	920,888	1,001,745	10,039	1,011,784	1.10	contractor	prescriptive		union	
40	21803	2,409,211	1,900,500	908,000	2,808,500	1.17	contractor	both			25%
41	21900	94,5746	1,088,033	85,287	1,173,320	1.24	contractor	prescriptive	30	union	100%
42	2373	349,810	297,581	20,397	317,978	0.91	contractor	prescriptive			20%
43	25015	294,069	283,480	72,994	356,474	1.21	contractor	prescriptive			0%
44	25048	462,896	500,214	21,846	522,060	1.13	contractor	prescriptive			10%
45	25382	480,450	510,855	347,051	857,906	1.79	contractor	performance			
46	25458	13,163	7,743	2,633	1,0376	0.79	contractor	prescriptive			100%
47	26056	618,638	631,574	0	631,574	1.02	contractor	other			50%
48	26105	450,614	323,797	87,359	411,156	0.91	contractor	prescriptive			0%
49	26156	383,446	469,358	12,919	482,277	1.26	contractor	prescriptive			70%
50	26157	269,500	0	0	0	0.00	contractor	prescriptive			10%

BOMA Response Number	Building/Survey Num- ber	SF	Cleaning \$	Rds & Grds \$	Total Cleaning	Cleaning \$/SF	Cleaning Performed By	Type of Contract	FTEs	Staff Type	% Prestige Service
51	26183	27,436	23,110	4,939	28,049	1.02	contractor	prescriptive			
52	26436	64,208	29,735	28,590	58,325	0.91	contractor	prescriptive			50%
53	27044	151,349	153,646	24,149	1,77,795	1.17	contractor	other			0%
54	27057	240,000	246,129	57,493	303,622	1.27	contractor	prescriptive			0%
55	27060	546,785	1,350,000	0	1,350,000	2.47	contractor		32		
56	2710	165,812	172,007	64,360	236,367	1.43	contractor	prescriptive			90%
57	27128	252,496	247,215	139,358	386,573	1.53	contractor	performance			100%
58	27194	232,285	275,953	22,848	298,801	1.29	contractor	both			
59	272	92,933	153,592	7,000	160,592	1.73	in-house		7	non-union	
60	28024	86,059	19,480	33,554	53,034	0.62					
61	28049	238,663	185,426	4,5171	230,597	0.97	contractor	prescriptive			0%
62	28055	69,077	64,444	32,420	96,864	1.40	contractor	other			0%
63	28082	1,125,341	1,312,275	57,580	1,369,855	1.22	contractor	prescriptive			30%
64	28301	57,967	45,948	22,355	68,303	1.18	contractor	prescriptive			100%
65	28302	78,907	60,143	29,669	89,812	1.14		prescriptive			100%
66	28303	106,338	86,335	38,787	125,122	1.18	contractor	prescriptive			100%
67	28314	100,932	71,052	44,658	115,710	1.15	contractor	prescriptive			100%
68	28315	118,750	85,296	53,376	138,672	1.17	contractor	prescriptive			100%
69	28316	92,600	83,825	36,939	120,764	1.30	contractor	prescriptive			100%
70	28398	116,993	126,505	19,409	145,914	1.25	contractor	prescriptive			0%
71	28672	349,270	266,683	61,620	328,303	0.94	contractor	prescriptive			100%
72	28716	133,282	106,151	12,158	118,309	0.89	combination	prescriptive	1		
73	29079	225,069	202,103	129,412	331,515	1.47	contractor	prescriptive			100%
74	29088	256,535	83,473	56,853	140,326	0.55	contractor	prescriptive			0%
75	29109	47,421	89,226	16,266	105,492	2.22	contractor	performance			
76	29118	332,608	0	0	0	0.00	contractor	performance	7	union	0%
77	29423	21,000	5,348	0	5,348	0.25	contractor	prescriptive			0%

BOMA Response Number	Building/Survey Num- ber	SF	Cleaning \$	Rds & Grds \$	Total Cleaning	Cleaning \$/SF	Cleaning Performed By	Type of Contract	FTEs	Staff Type	% Prestige Service
78	29424	21,000	4,520	3,295	7,815	0.37	contractor	prescriptive			0%
79	29473	791,306	840,209	148,074	988,283	1.25	combination	prescriptive	1	non-union	5%
80	29592	600,000	439,155	110,082	549,237	0.92	combination	prescriptive	2	non-union	15%
81	29625	104,282	45,668	14,962	60,630	0.58	contractor	prescriptive			100%
82	29808	1,010,520	1,463,219	34,606	1,497,825	1.48	contractor	prescriptive	32	union	100%
83	29847	2,003,288	2,648,170	57,704	2,705,874	1.35	contractor	other			
84	29856	369,134	324,763	56,928	381,691	1.03	contractor	other	11	non-union	0%
85	3297	214,486	228,567	21,728	250,295	1.17	contractor	prescriptive			100%
86	3895	175,739	433,173	0	433,173	2.46	combination	performance	1	union	100%
87	40034	183,920	153,298	54,663	207,961	1.13	contractor	prescriptive			0%
88	40064	326,737	455,769	8,660	464,429	1.42	contractor	performance			0%
89	40065	355,869	271,665	13,313	284,978	0.80	contractor	prescriptive			0%
90	40075	133,594	107,971	28,485	136,456	1.02	contractor	prescriptive			
91	40088	215,016	247,268	0	247,268	1.15	contractor	prescriptive	2		25%
92	40108	25,870	31,056	12,680	43,736	1.69	contractor	prescriptive			
93	40145	188,706	244,585	108,011	352,596	1.87	contractor	prescriptive			0%
94	40204	486,935	355,424	83,340	438,764	0.90	contractor	prescriptive			50%
95	40275	157,584	206,976	6,288	213,264	1.35	contractor	prescriptive			0%
96	40361	149,417	106,021	37,836	143,857	0.96	contractor	prescriptive			100%
97	40437	1,462,488	1,304,814	30,154	1,334,968	0.91	contractor	performance	6		25%
98	5221	138,000	220,301	8,973	229,274	1.66	contractor	prescriptive			100%
99	5222	182,300	264,678	15,800	280,478	1.54	contractor	prescriptive			91%
100	5399	398,726	311,829	53,679	365,508	0.92	contractor	prescriptive	3	non-union	5%

BOMA Response Number	Building/Survey Number	SF	Cleaning \$	Rds & Grds \$	Total Cleaning	Cleaning \$/SF	Cleaning Performed By	Type of Contract	FTEs	Staff Type	% Prestige Service
101	6034	136,991	123,952	38,734	162,686	1.19	contractor	prescriptive			2%
102	813	575,294	694,353	31,644	725,997	1.26	contractor	prescriptive			
103	8224	1,194,853	1,306,049	101,881	1,407,930	1.18	contractor	prescriptive			0%
104	8277	2,086,136	3,588,154	146,030	3,734,184	1.79	contractor	prescriptive			20%
105	8392	136,603	60,883	27,290	88,173	0.65	contractor	prescriptive			0%
106	8581	626,684	852,864	60,263	913,127	1.46	contractor	prescriptive			5%
107	8590	133,594	107,971	28,485	136,456	1.02	contractor	prescriptive			
108	9317	872,880	1,601,550	0	1,601,550	1.83	contractor	other	37	union	0%
109	9320	228,601	229,903	8,667	238,570	1.04	contractor	prescriptive			100%
110	9517	266,467	205,675	58,224	263,899	0.99	contractor	prescriptive	1	non-union	

QUESTION 15

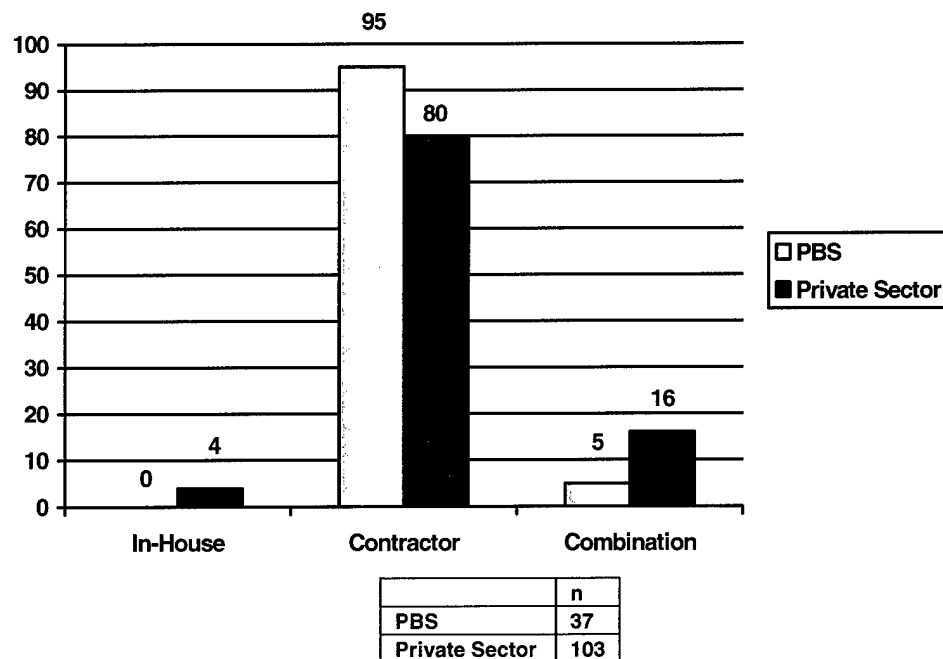
Roads and Grounds performed by (check one):

☐ In-house staff ☐ Contractor ☐ Combination

The following table summarizes survey responses:

Organization	Number of Responses	In-House	Contractor	Combination
PBS	37	0	35 (95%)	2 (5%)
Private Sector	103	4 (4%)	82 (80%)	17 (16%)

Percentage of Responses (Roads & Grounds)



Based on the responses, we can conclude that both PBS and private sector use primarily contractors to perform roads and grounds tasks.

QUESTION 16

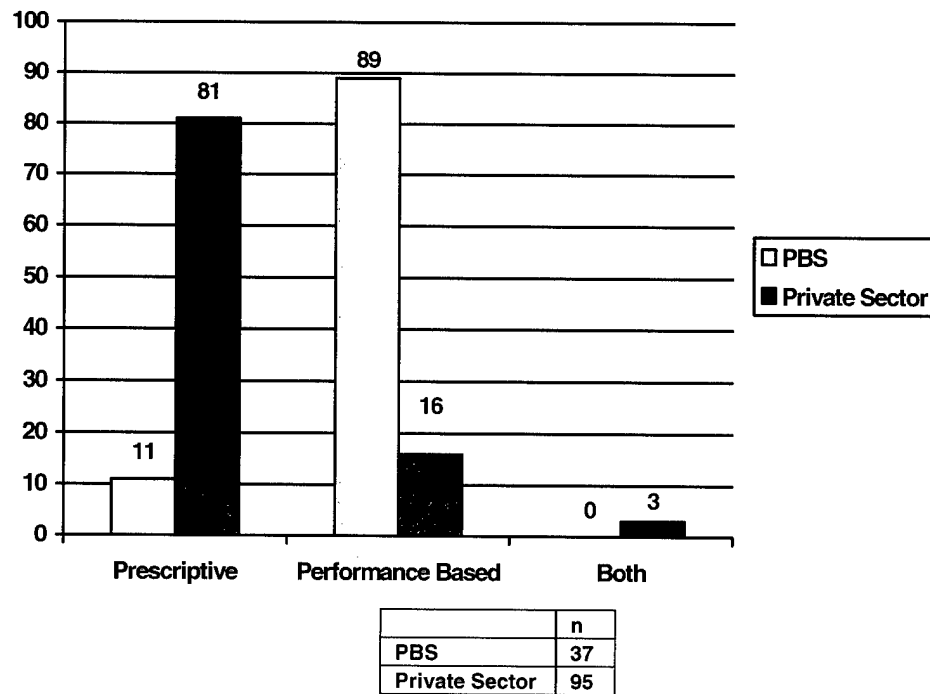
If contractor, indicate type of contract:

- ___ Prescriptive (task frequency)
 ___ Performance based
 ___ Other (specify): _____

The following table summarizes survey responses:

Organization	Number of Responses	Prescriptive	Performance Based	Both
PBS	37	4 (11%)	33 (89%)	
Private Sector	95	77 (81%)	15 (16%)	3 (3%)

Percentage of Responses by Type of Contract



From the survey responses, we can conclude that PBS buildings use performance-based roads and ground contracts while private sector buildings use prescriptive based contracts.

QUESTION 17

If in-house, indicate the total number of in-house roads and grounds personnel:

Category	Number of In-House Roads and Grounds Personnel
Full Time	
Part Time	

The following tables summarize survey responses for both the number of full-time and part-time in-house roads and grounds personnel:

Organization	Number of Responses	Average Number of PT Employees	Average Number of FT Employees
PBS	5	0	3
Private Sector	20	2	2

Note: Based on the examination of the data, in almost all instances, it appears that roads and grounds crews are mostly full-time employees or a combination of part-time employees with a few or full-time employees, probably supervisors.

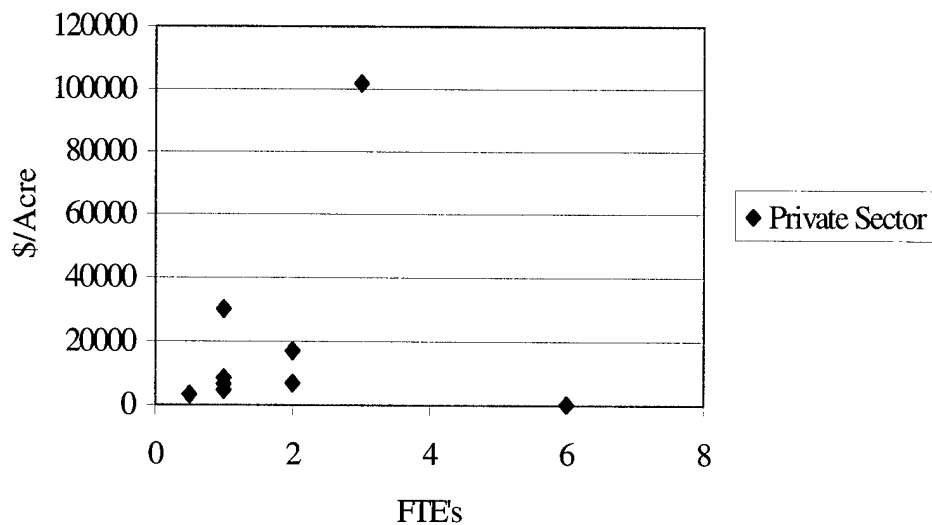
The following table shows the ratio of the usage of full time to part time crews for both PBS and private sector:

Organization	F/T Crew: P/T Crew
PBS	3:0
Private Sector	2:1

From the table, we can conclude that both PBS and the private sector are more likely to use full-time crews than part-time crews.

The following chart plots the crew size (FTEs) and cost per acre for the private sector only:

FTEs vs. Roads & Grounds Costs



Contrary to what we expected, the data does not show a strong relationship between FTEs and cost per acre.

The following tables show responses for both PBS and private sector:

PBS Building ID	# of F/T Employees	# of P/T Employees	FTE	Building Acres	Rds&Grds \$	\$/Acres	Acres per FTE	F/T or P/T
CA0150CC	1		1					F/T
CA0191ZZ	1	0	1	5			5	F/T
CA0273ZZ	1	0	1					F/T
MA0011ZZ	7	0	7					F/T
MA0013ZZ	7	0	7					F/T

BOMA Building ID	# of F/T Employees	# of P/T Employees	FTE	Improved Acres	Rds&Grds \$	\$/Acres	Acres per FTE	F/T or P/T
10047	1	1	1.50		40,492			
16271	2	4	4		178,625			P/T
16334	2	0	2					F/T
20035	1	0	1		118,106			F/T
20596	1	2	2	12	205,060	17,088	6	P/T
26156	1	0	1		12,919			F/T
272	2	0	2	1	7,000	7,000	1	F/T
29088	1	0	1	12	56,853	4,738	12	F/T
29424	0	1	0.50	1	3,295	3,295	2	P/T
29473	0	2	1	22	1,48,074	6,731	22	P/T
29592	3	0	3		110,082			F/T
29808	4	0	4		34,606			F/T
3297	1	0	1		21,728			F/T
40064	1	1	1	1	8,660	8,660	1	
40088	2	0	2					F/T
40108	5	2	6	50	12,680	254	8	F/T
40437	1	5	3.50		30,154			P/T
8224	3	0	3	1	101,881	101,881	0.33	F/T
8581	1	0	1	2	60,263	30,132	2	F/T
9317	1	1	1					

QUESTION 18

If in-house, is the road and grounds staff predominantly (check one): ☐ Union
☐ Non-union

The following table summarizes survey responses:

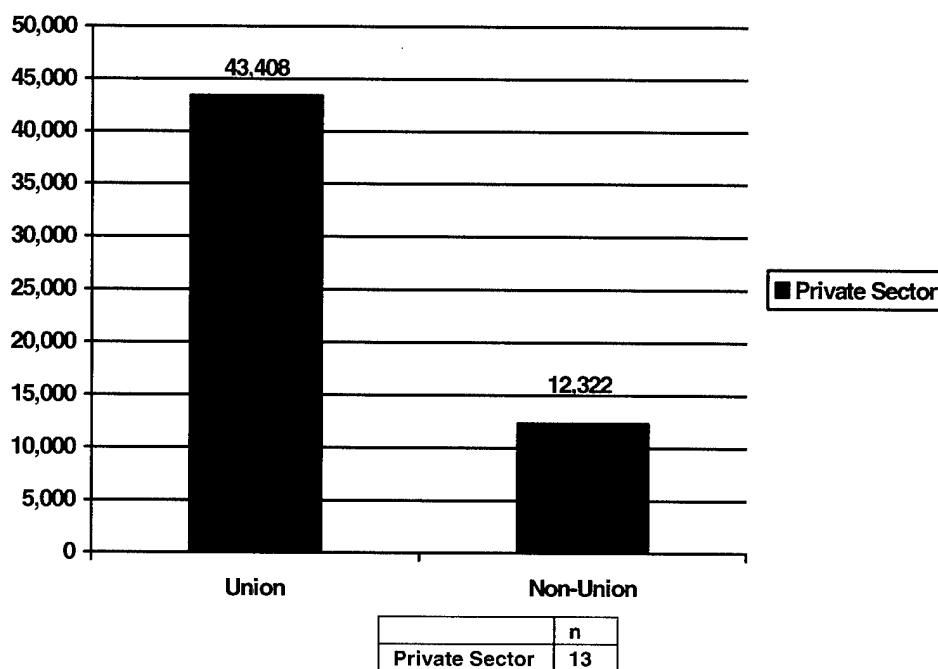
Organization	Number of Responses	Union Staff	Non-union Staff
PBS	5	1	4
Private Sector	28	10	18

The following table shows, based on the number of responses, a comparison between the number of union versus non-union employees by different cities for both PBS and private sector buildings:

Organization	Los Angeles		Atlanta		Chicago		Boston		Dallas	
	Union	Non-union	Union	Non-union	Union	Non-Union	Union	Non-Union	Union	Non-union
PBS	1	2						2		
Private Sector	1	5		5	8	3	1	1		4

The following chart presents private sector costs for union and non-union roads and grounds staff for private sector only:

Average \$/Acre by Staff Type



The chart above shows that the average unit cost for private sector roads and grounds is higher when union staff is used than when non-union staff is used.

QUESTION 19

Area of improved/landscaped land (acreage): _____

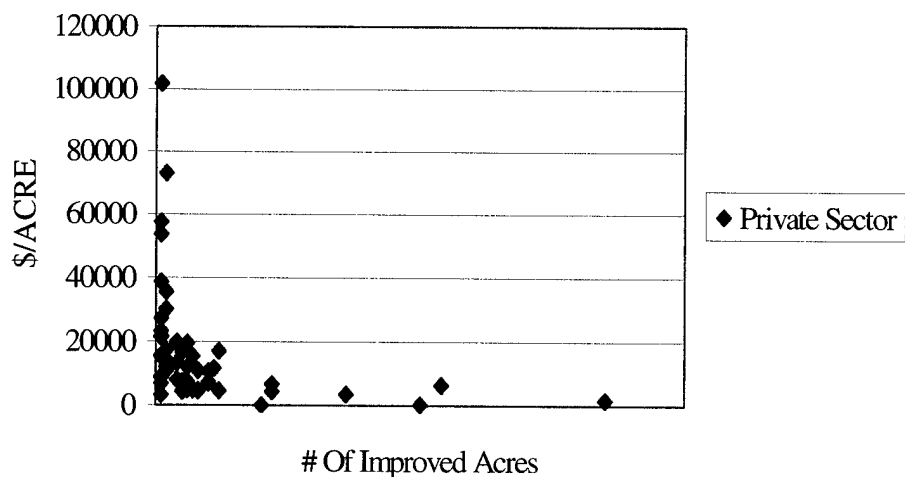
The following table summarizes survey responses

Organization	Number of Responses	Average Acres
PBS	10	2
Private Sector	53	9

Note: We assume that some of the data was in SF so we converted into acres.

The following chart plots the amount of roads and grounds and the unit cost for the private sector only:

Number of Improved Acres vs. Roads & Grounds Costs



The chart above shows that there is a very weak relationship between the quantity of improved acreage and the unit cost of roads and grounds in the private sector.

QUESTION 20

Indicate the tasks performed as part of roads and grounds service (check all that apply):

- ☐ Tree pruning
- ☐ Shrub trimming
- ☐ Planting
- ☐ Snow removal
- ☐ Grass cutting
- ☐ Hosing down sidewalks
- ☐ Sidewalk sweeping
- ☐ Parking garage cleaning/sweeping
- ☐ Other (specify):

Based on the survey responses we can examine the service variation between PBS and the private sector buildings:

- ◆ The tasks performed as part of roads and ground service by both PBS and private sector crew are generally consistent:
 - PBS does more sidewalk hosing and cleaning/sweeping of parking garage.
 - Private sector does more tree pruning, planting and snow removal.

In order to show the “Yes” responses in charts for both PBS and private sector, we have combined the different tasks into three groupings:

A	Tree pruning Shrub trimming Planting Grass cutting
B	Snow removal
C	Hosing down sidewalks Sidewalk sweeping Parking garage cleaning/sweeping

Group A:

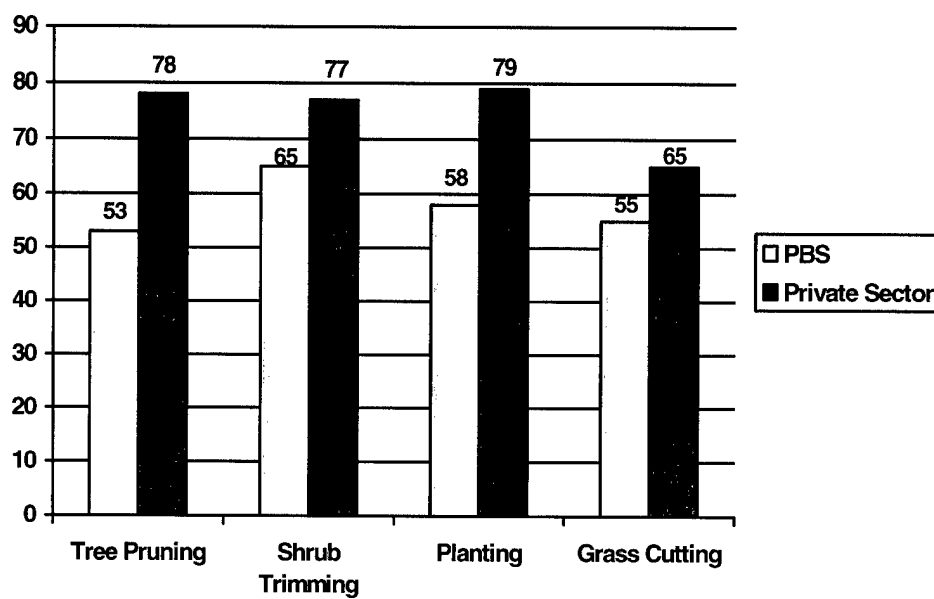
Tree pruning

Shrub trimming

Planting

Grass cutting

Percent of "Yes" Responses by Task

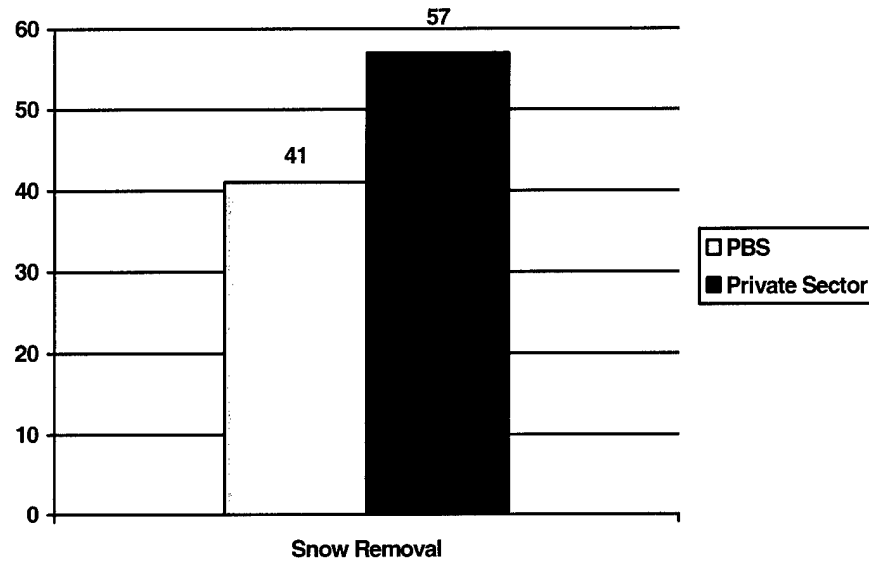


	n
PBS	40
Private Sector	109

Group B:

Snow removal

Percentage of "Yes" Responses by Task



	n
PBS	39
Private Sector	109

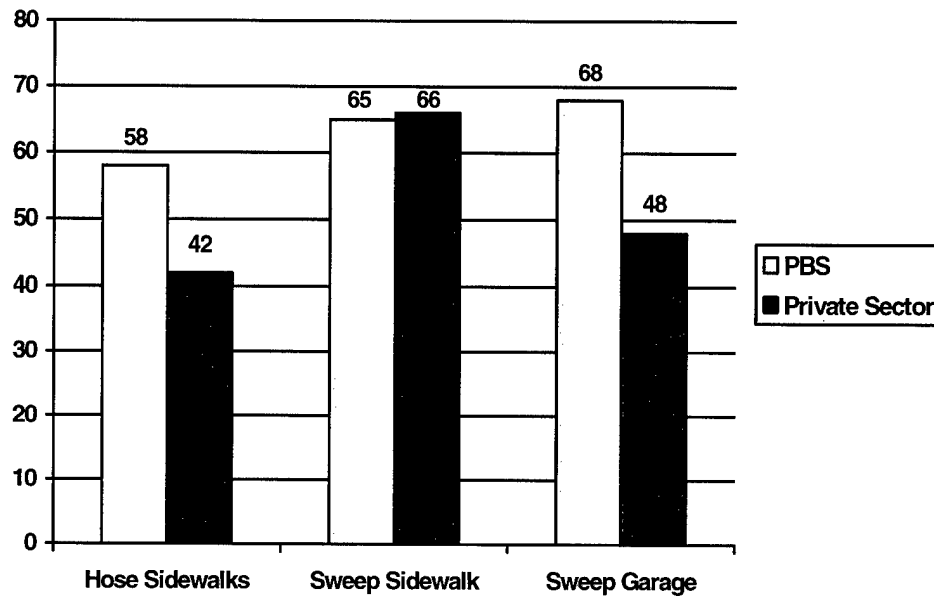
Group C:

Hosing down sidewalks

Sidewalk sweeping

Parking garage cleaning/sweeping

Percentage of "Yes" Responses by Task



	n
PBS	40
Private Sector	109

The following tables summarizes survey responses for Roads and Grounds for both PBS and private sector:

Response Number	PBS Building/Survey Number	Acres	Rds & Grds \$	Rds & Grds \$/Acres	Rds & Grds Performed By	Type of Contract	FTEs	Staff Type
1	CA0150CC				contractor	performance	1	non-union
2	CA0168ZZ				contractor	performance		
3	CA0191ZZ	5			contractor	performance	1	non-union
4	CA0224ZZ				contractor	performance		
5	CA0273ZZ	0.11			contractor	performance	1	
6	CA0283CC				contractor	performance		union
7	GA0007ZZ				contractor	performance		
8	GA0008ZZ							
9	GA0087AD				contractor	performance		
10	GA0121ZZ				contractor	performance		
11	GA0125ZZ				contractor	performance		

Response Number	PBS Building/Survey Number	Acres	Rds & Grds \$	Rds & Grds \$/Acres	Rds & Grds Performed By	Type of Contract	FTEs	Staff Type
12	GA0501AA				contractor	performance		
13	IL0054ZZ				contractor	performance		
14	IL0205ZZ				contractor	performance		
15	IL0209CF	4			contractor	performance		
16	IL0235FC	1			contractor	performance		
17	IL0236FC	1			contractor	performance		
18	MA0050ZZ	2			contractor	performance		
19	MA0131ZZ				contractor	performance		
20	MA0138ZZ				contractor	performance		
21	MA0153ZZ				contractor	performance		
22	R1 CA0041ZZ				contractor	performance		
23	R1 CA0149ZZ				contractor	performance		
24	R1 CA0185ZZ				contractor	performance		
25	R1 CA9551RR				contractor	performance		
26	R1 MA0011ZZ				combination	performance	7	non-union
27	R1 MA0013ZZ				combination	performance	7	non-union
28	R1 MA0076ZZ				contractor	performance		
29	R1 MA0135ZZ				contractor	prescriptive		
30	R1 MA0158ZZ				contractor	performance		
31	R5 IL0032ZZ	2			contractor	performance		
32	R5 IL0231ZZ				contractor	performance		
33	R5 IL0300ZZ							
34	R5 IL0303ZZ				contractor	performance		
35	TX0057ZZ				contractor	prescriptive		
36	TX0058DA							
37	TX0200ZZ	1			contractor	performance		
38	TX0284DA				contractor	performance		
39	TX0292ZZ	1			contractor	prescriptive		
40	TX0302ZZ	1			contractor	prescriptive		

Response Number	BOMA Building/Survey Number	Improved Acres	Rds & Grds \$	Rds & Grds \$/Acres	Rds & Grds Performed By	Type of Contract	FTEs	Staff Type
1	10047		40,492		in-house		1.50	non-union
2	10110		58,816		contractor			
3	10341		11,411		contractor	performance		
4	10517	4	79,640	19,910	contractor	performance		
5	12293		25,970		combination			union
6	12443		57,666		contractor	prescriptive		
7	1251				contractor	prescriptive		
8	12839	1	23,344	23,344	contractor	prescriptive		
9	12840	1	21,332	21,332	contractor	performance		
10	13030				contractor	performance		union
11	13050		87,834		contractor	prescriptive		
12	13139	4	78,568	19,642	contractor	prescriptive		
13	13298	10	70,930	7,093	contractor	prescriptive		
14	13505		60,963		contractor	prescriptive		non-union
15	13534	2	28,553	14,277	contractor	prescriptive		
16	13670	2	34,631	17,316	contractor	prescriptive		
17	13852	10	74,355	7,436	contractor	prescriptive		
18	14097		4,969		contractor	prescriptive		
19	1412		40,853		contractor	prescriptive		
20	15818	11	128,883	11,717	contractor	prescriptive		
21	16271		178,625		combination	prescriptive	4	non-union
22	16334				contractor	prescriptive	2	non-union
23	16423	2	21,729	10,865	contractor	prescriptive		
24	17651	10	107,985	10,799	contractor	prescriptive		
25	17690		11,981		contractor	prescriptive		non-union
26	17753	2	71,324	35,662	contractor	prescriptive		
27	18131		79,557		contractor	prescriptive		
28	18157		13,641		combination	prescriptive		union
29	18464		13,704		contractor	prescriptive		non-union
30	18811	1	15,311	15,311	contractor	prescriptive		
31	19667		5,026					
32	20035	6	118,106	19,684	combination	prescriptive	1	union
33	20266		53,830		contractor	prescriptive		
34	20300	22	96,946	4,407	contractor	prescriptive		
35	20538		28,529		contractor	performance		
36	20596	12	205,060	17,088	combination	prescriptive	2	non-union
37	21068		78,077					
38	21677		31,953		contractor	prescriptive		
39	21703		10,039					
40	21803		908,000		contractor	prescriptive		
41	21900		85,287		contractor	prescriptive		union
42	2373		20,397		contractor	prescriptive		

Response Number	BOMA Building/Survey Number	Improved Acres	Rds & Grds \$	Rds & Grds \$/Acres	Rds & Grds Performed By	Type of Contract	FTEs	Staff Type
43	25015	6	72,994	12,166	combination	prescriptive		
44	25048	1	21,846	21,846	contractor	prescriptive		
45	25382	54	347,051	6,427	contractor	performance		
46	25458		2,633		contractor	prescriptive		
47	26056				contractor	prescriptive		
48	26105	8	87,359	10,920	contractor	prescriptive		
49	26156		12,919		in-house		1	union
50	26157	20			contractor	performance		
51	26183		4,939		contractor	prescriptive		
52	26436	2	28,590	14,295	contractor	prescriptive		
53	27044	2	24,149	12,075	contractor	both		
54	27057		57,493		combination	prescriptive		
55	27060							
56	2710		64,360		contractor	prescriptive		
57	27128	85	139,358	1,640	contractor	both		
58	27194		22,848		combination	both		
59	272	1	7,000	7,000	in-house		2	non-union
60	28024	7	33,554	4,793	contractor	prescriptive		
61	28049	6	45,171	7,529	contractor			non-union
62	28055	4	32,420	8,105	contractor	prescriptive		non-union
63	28082	1	57,580	57,580	contractor	prescriptive		
64	28301	5	22,355	4,471	contractor	prescriptive		
65	28302	6	29,669	4,945	contractor	prescriptive		
66	28303	8	38,787	4,848	contractor	prescriptive		
67	28314	6	44,658	7,443	contractor	prescriptive		
68	28315	4	53,376	13,344	contractor	prescriptive		
69	28316	8	36,939	4,617	contractor	prescriptive		
70	28398		19,409		contractor	prescriptive		
71	28672		61,620		contractor	prescriptive		
72	28716		12,158		contractor	prescriptive		
73	29079	36	129,412	3,595	contractor	prescriptive		
74	29088	12	56,853	4,738	contractor	prescriptive	1	
75	29109		16,266		contractor	performance		
76	29118							
77	29423				contractor	performance		
78	29424	1	3,295	3,295	in-house	prescriptive	0.50	non-union
79	29473	22	148,074	6,731	combination	prescriptive	1	non-union
80	29592		110,082		combination	prescriptive	3	non-union
81	29625		14,962		contractor	prescriptive		
82	29808		34,606		contractor	prescriptive	4	union
83	29847		57,704		contractor	prescriptive		
84	29856		56,928		contractor			

Response Number	BOMA Building/Survey Number	Improved Acres	Rds & Grds \$	Rds & Grds \$/Acres	Rds & Grds Performed By	Type of Contract	FTEs	Staff Type
85	3297		21,728		combination	prescriptive	1	non-union
86	3895							
87	40034		54,663		contractor	prescriptive		
88	40064	1	8,660	8,660	combination	performance	1	union
89	40065		13,313		contractor	prescriptive		
90	40075		28,485		contractor	prescriptive		
91	40088				contractor	prescriptive	2	
92	40108	50	12,680	254	combination	prescriptive	6	non-union
93	40145	7	108,011	15,430	contractor	prescriptive		
94	40204	5	83,340	16,668	contractor	prescriptive		
95	40275		6,288		contractor			
96	40361	5	37,836	7,567	contractor	prescriptive		
97	40437		30,154		contractor	performance	3.50	
98	5221	1	8,973	8,973	contractor	prescriptive		
99	5222	1	15,800	15,800	contractor	prescriptive		non-union
100	5399	1	53,679	53,679	contractor	prescriptive		
101	6034	1	38,734	38,734	contractor	prescriptive		
102	813		31,644					
103	8224	1	101,881	101,881	combination	prescriptive	3	union
104	8277	2	146,030	73,015	contractor	prescriptive		
105	8392	1	27,290	27,290	combination	prescriptive		non-union
106	8581	2	60,263	30,132	combination	performance	1	non-union
107	8590		28,485		contractor	prescriptive		
108	9317				combination	performance	1	union
109	9320	1	8,667	8,667	contractor	performance		
110	9517		58,224		contractor	prescriptive		

APPENDIX D. ANALYSIS OF SURVEY RESPONSES: MAINTENANCE AND REPAIR SERVICES

In this appendix, we present a complete analysis of the responses to the survey questions about maintenance and repair services. We have organized the responses by survey question number, as follows:

<u>Question</u>	<u>Page</u>
Q21. Contract/in-house labor	D-3
Q22. Type of contract	D-5
Q23. Full-time/part-time personnel mix (in-house labor)	D-6
Q24. Union/non-union	D-10
Q25. Indicate systems that have been renovated and year	D-12
Q26. What is the property management liability threshold	D-27
Q27. Are maintenance and repairs above the liability threshold typically performed by the property manager on a reimbursable basis, contracted to another company to perform work, or other	D-28
Q28. At what dollar threshold are repair costs capitalized rather than expensed	D-30
Q29. What is the negotiated service call response time for O&M contracts	D-31
Q30. Do you perform preventive maintenance on any of your building systems	D-37
Q31. Number of elevator door openings	D-51
Q32. Type of elevator	D-53
Q33. Indicate the type of HVAC systems	D-54
Q34. Indicate where electrical repair responsibilities begin	D-60
Q35. Indicate the type of fire/life safety equipment in the building	D-61
Q36. Indicate if system receives above manufacturer's recommended PM	D-66

QUESTION 21

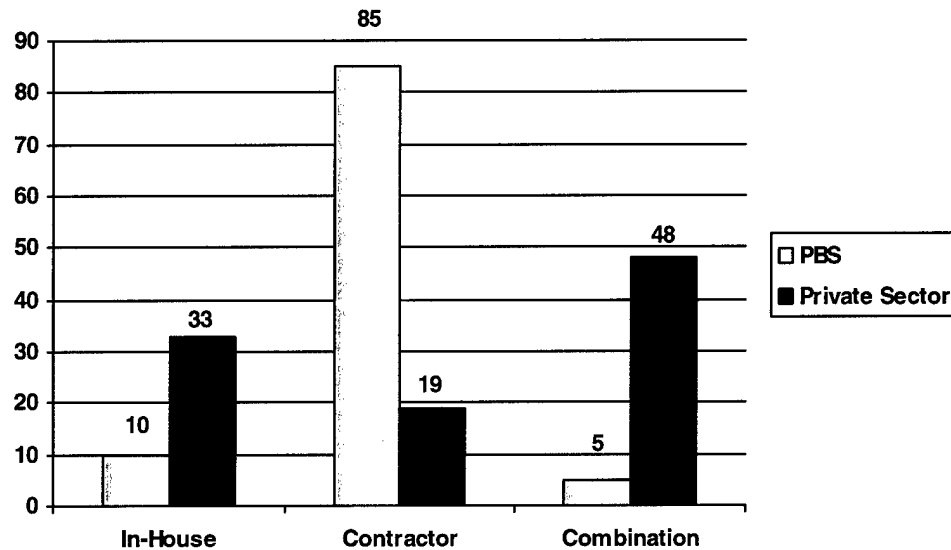
Maintenance and repair performed by (check one):

☐ In-house ☐ Contractor ☐ Combination

The following table summarizes survey responses:

Organization	Number of Responses	In-house	Contractor	Combination
PBS	39	4 (10%)	33 (85%)	2 (5%)
Private Sector	109	36 (33%)	21 (19%)	52 (48%)

Percentage of Responses by Maintenance & Repair



	n
PBS	39
Private Sector	109

Based on the responses, we can conclude that PBS uses contractors to perform maintenance and repair tasks while private sector uses mainly combination.

As part of our analysis, we examined Question 20C and 20B of the BOMA Experience Exchange Report to identify any trends based on the categories that best fit the building's type of use. The following table shows survey responses for question 20C:

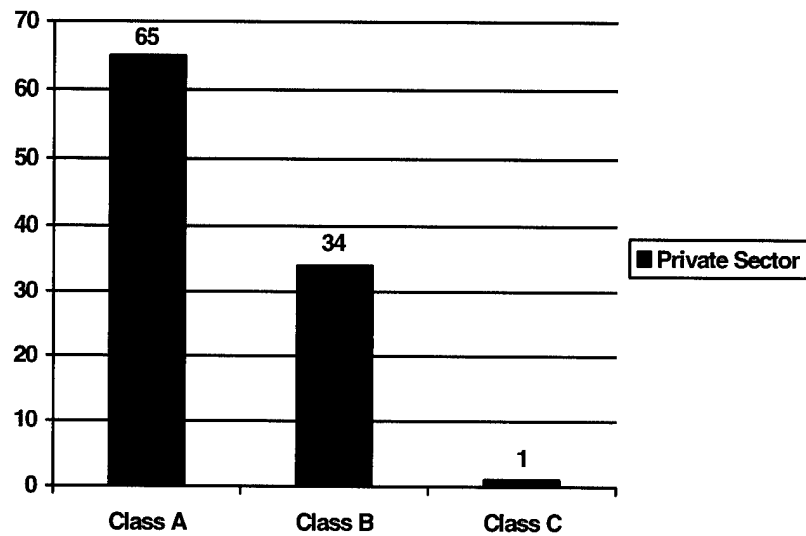
Organization	Number of Responses	General	Single Purpose	75%+ Medical	75%+ Financial	Government-owned	Corporate Facility
Private Sector	109	96 (88%)	2 (2%)	1 (1%)	3 (3%)	2 (2%)	5 (4%)

The table above shows that almost all private sector survey respondents are general use buildings.

The following table and chart show survey responses for question 20B:

Organization	Number of Responses	Class A	Class B	Class C
Private Sector	109	71 (65%)	37 (34%)	1 (1%)

Percentage of Responses by Type



	n
PBS	35
Private Sector	68

QUESTION 22

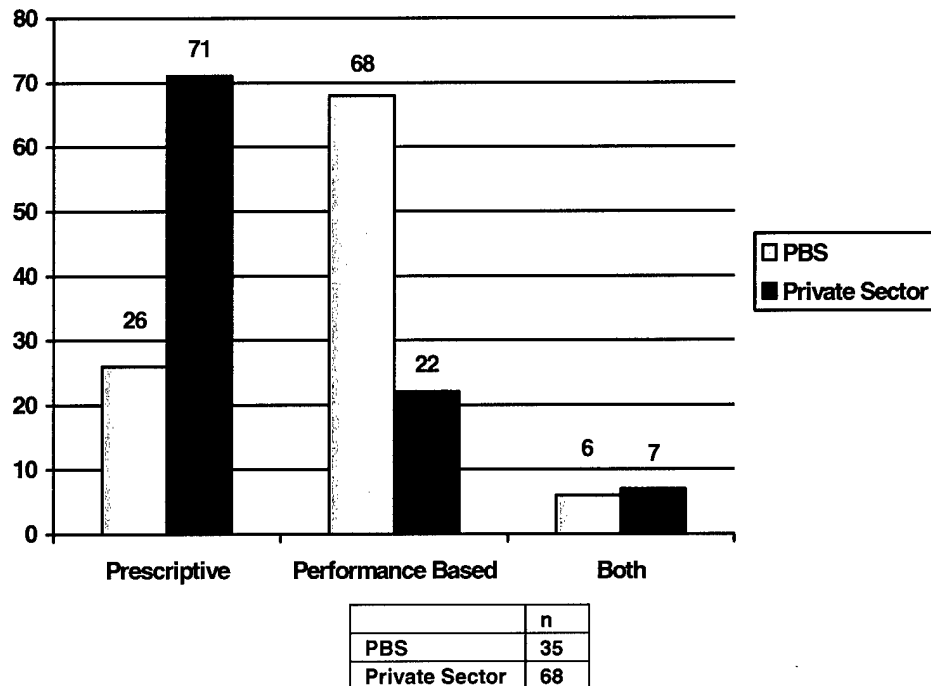
If contractor, indicate type of contract:

- ☐ Prescriptive (task frequency)
- ☐ Performance based
- ☐ Other (specify): _____

The following table summarizes survey responses:

Organization	Number of Responses	Prescriptive	Performance Based	Both
PBS	35	9 (26%)	24 (68%)	2 (6%)
Private Sector	68	48 (71%)	15 (22%)	5 (7%)

Percentage of Responses by Type



From the survey responses, we can conclude that PBS buildings use performance-based maintenance and repair contracts while private sector buildings use prescriptive based contracts.

QUESTION 23

If in-house, indicate the total number of in-house maintenance and repair personnel:

Category	Number of In-House Maintenance and Repair Personnel
Full Time	
Part Time	

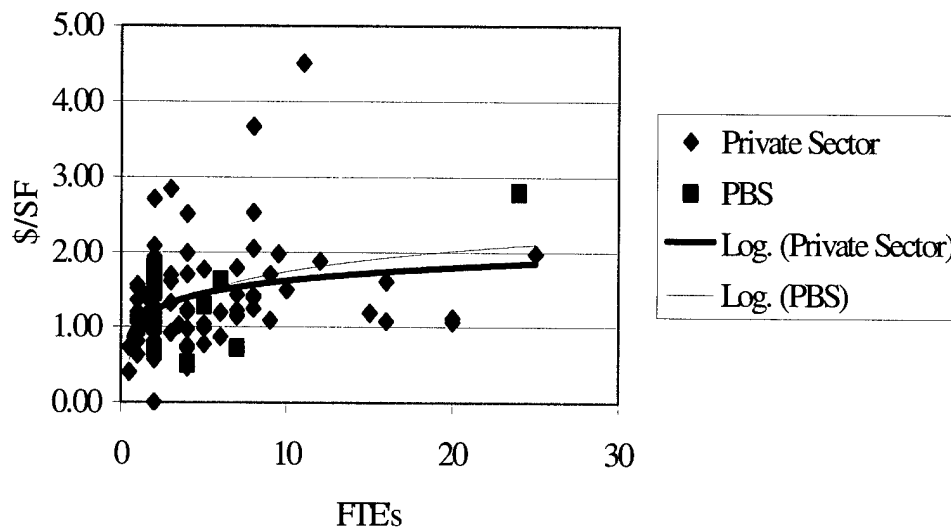
The following tables summarize survey responses for both the number of full-time and part-time in-house maintenance and repair personnel:

Organization	Number of Responses	Average Number of PT Employees	Average Number of FT Employees
PBS	10	0	6
Private Sector	88	1	5

Note: Based on the examination of the data, in almost all instances, it appears that repair and maintenance crews are almost always comprised of full-time employees.

The following chart plots the maintenance and repair crew size (FTE's) and repair and maintenance unit cost for both PBS and private sector.

FTE's vs. Repair & Maintenance Costs



The following tables show responses for both PBS and private sector:

Building ID	# of F/T Employees	# of P/T Employees	FTE	Building SF	R/M \$	\$/SF	SF per FTE	F/T or P/T
CA0150CC	7		7	1,015,311	730,680	0.72	145,044	F/T
CA0168ZZ	5		5	518,951	670,904	1.29	103,790	F/T
CA0191ZZ	2		2	204,338	298,626	1.46	102,169	F/T
CA0273ZZ	2		2	216,512	391,772	1.81	108,256	F/T
GA0007ZZ	4		4	328,275	167,295	0.51	82,069	F/T
GA0008ZZ	2		2	158,339	111,688	0.71	79,170	F/T
IL0205ZZ	24		24	1,259,381	3,522,736	2.80	52,474	F/T
CA0041ZZ	6		6	703,302	1,143,308	1.63	117,217	F/T
MA0011ZZ	2		2	134,400	221,749	1.65	67,200	F/T
MA0013ZZ	2		2	556,865	564,890	1.01	278,433	F/T

Building ID	# of F/T Employees	# of P/T Employees	FTE	Building SF	R/M \$	\$/SF	SF per FTE	F/T or P/T
10047	1	1	1.50	101,938	107,610	1.06	67,959	
10110	2		2	360,815	337,011	0.93	180,408	F/T
10341	7		7	525,830	939,052	1.79	75,119	F/T
10517	2		2	394,324	376,619	0.96	197,162	F/T
12293	11		11	453,433	2,044,857	4.51	41,221	F/T
12443	2		2	343,602	372,402	1.08	171,801	F/T
1251	9	1	9.50	690,341	1,365,389	1.98	72,668	F/T
12839	2		2	604,428	679,048	1.12	302,214	F/T
12840	6		6	369,983	441,239	1.19	61,669	F/T
13030	8		8	978,335	2,000,946	2.05	122,292	F/T
13050	3	1	3.50	634,381	647,721	1.02	181,252	F/T
13139	4		4	252,870	503,292	1.99	63,218	F/T
13505	2		2	151,296	88,690	0.59	75,648	F/T
13534	2		2	79,800	85,377	1.07	39,900	F/T
13670	1		1	167,756	151,368	0.90	167,756	F/T
13852	4		4	390,721	292,364	0.75	97,680	F/T
14097	4		4	134,490	166,058	1.23	33,623	F/T
1412	5		5	637,069	1,126,953	1.77	127,414	F/T
15818	7		7	525,422	641,049	1.22	75,060	F/T
16334	1		1	215,016	292,422	1.36	215,016	F/T
16423	4		4	418,604	500,287	1.20	104,651	F/T
17651		1	0.50	173,492	69,091	0.40	346,984	P/T
17690	2		2	180,800	166,464	0.92	90,400	F/T
17753	16		16	1,411,254	2,277,823	1.61	88,203	F/T
18131	8		8	715,051	995,611	1.39	89,381	F/T
18157	4		4	317,052	539,700	1.70	79,263	F/T
18464	1	1	1.50	96,717	136,711	1.41	64,478	
19667	20		20	1,572,454	1,767,708	1.12	78,623	F/T
20035	3		3	251,943	332,927	1.32	83,981	F/T
20300	3		3	293,003	268,201	0.92	97,668	F/T

Building ID	# of F/T Employees	# of P/T Employees	FTE	Building SF	R/M \$	\$/SF	SF per FTE	F/T or P/T
20538	7		7	622,487	891,070	1.43	88,927	F/T
20596	4		4	378,538	173,248	0.46	94,635	F/T
21677	8		8	531,148	753,815	1.42	66,394	F/T
21703	20		20	920,888	986,296	1.07	46,044	F/T
21900	8		8	945,746	1,181,888	1.25	118,218	F/T
2373	4		4	349,810	248,539	0.71	87,453	F/T
25015	2		2	294,069	357,599	1.22	147,035	F/T
26056	5		5	618,638	605,930	0.98	123,728	F/T
26105	7		7	450,614	514,249	1.14	64,373	F/T
26156	3		3	383,446	618,385	1.61	127,815	F/T
26183	1		1	27,436	22,328	0.81	27,436	F/T
26436	1		1	64,208	72,923	1.14	64,208	F/T
27060	8		8	546,785	2,005,000	3.67	68,348	F/T
2710	2		2	165,812	344,567	2.08	82,906	F/T
27128	12		12	252,496	475,340	1.88	21,041	F/T
272	3		3	92,933	264,070	2.84	30,978	F/T
28049	2		2	238,663	279,871	1.17	119,332	F/T
28055	1		1	69,077	64,870	0.94	69,077	F/T
28082	8		8	1,125,341	2,852,349	2.53	140,668	F/T
28301	1		1	57,967	61,316	1.06	57,967	F/T
28302	1		1	78,907	84,269	1.07	78,907	F/T
28303	1		1	106,338	127,634	1.20	106,338	F/T
28314	1		1	100,932	63,268	0.63	100,932	F/T
28315	1		1	118,750	111,471	0.94	118,750	F/T
28316	1		1	92,600	88,781	0.96	92,600	F/T
28398	1		1	116,993	106,991	0.91	116,993	F/T
28672	2		2	349,270	375,337	1.07	174,635	F/T
28716	1		1	133,282	208,464	1.56	133,282	F/T
29079	2		2	225,069	233,373	1.04	112,535	F/T
29088	2		2	256,535	145,225	0.57	128,268	F/T
29109		1	0.50	47,421	34,611	0.73	94,842	P/T
29118	2		2	332,608	0	0.00	166,304	F/T
29473	9		9	791,306	860,818	1.09	87,923	F/T
29592	7		7	600,000	695,724	1.16	85,714	F/T
29808	10		10	1,010,520	1,512,805	1.50	101,052	F/T
29847	16		16	2,003,288	2,171,109	1.08	125,206	F/T
29856	2		2	369,134	368,432	1.00	184,567	F/T
3297	2		2	214,486	416,167	1.94	107,243	F/T
3895	4		4	175,739	440,760	2.51	43,935	F/T
40065	2		2	355,869	493,079	1.39	177,935	F/T
40075	1		1	133,594	203,510	1.52	133,594	F/T
40088	1		1	215,016	292,422	1.36	215,016	F/T
40108	5	2	6	25,870	22,456	0.87	4,312	F/T
40204	5		5	486,935	506,556	1.04	97,387	F/T
40275	1		1	157,584	172,893	1.10	157,584	F/T
40361	1	1	1.50	149,417	171,721	1.15	99,611	

Building ID	# of F/T Employees	# of P/T Employees	FTE	Building SF	R/M \$	\$/SF	SF per FTE	F/T or P/T
40437	15		15	1,462,488	1,747,445	1.19	97,499	F/T
5221	2		2	138,000	167,594	1.21	69,000	F/T
5222	2		2	182,300	148,626	0.82	91,150	F/T
5399	3		3	398,726	672,386	1.69	132,909	F/T
6034	1		1	136,991	127,250	0.93	136,991	F/T
813	4		4	575,294	560,829	0.97	143,824	F/T
8224	5		5	1,194,853	924,683	0.77	238,971	F/T
8277	25		25	2,086,136	4,130,552	1.98	83,445	F/T
8392	2		2	136,603	173,363	1.27	68,302	F/T
8590	1		1	133,594	203,510	1.52	133,594	F/T
9317	9		9	872,880	1,480,576	1.70	96,987	F/T
9517	2		2	266,467	723,187	2.71	133,234	F/T

QUESTION 24

If in-house, is the maintenance and repair staff predominantly (check one): ____ Union
____ Non-union

The following table summarizes survey responses:

Organization	Number of Responses	Union Staff	Non-Union Staff
PBS	10	9	1
Private Sector	86	22	64

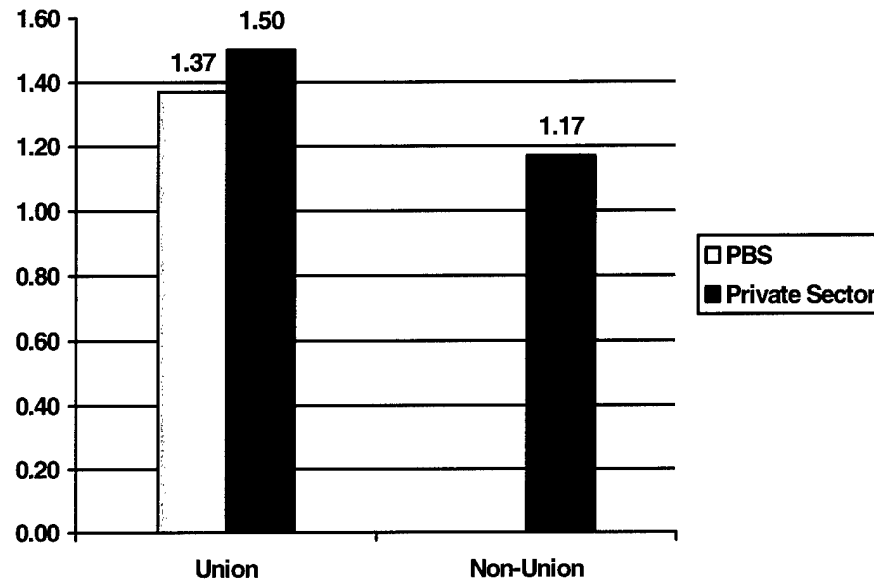
The following table shows, based on the number of responses, a comparison between the number of union versus non-union employees by different cities for both PBS and private sector buildings:

Organization	Los Angeles		Atlanta		Chicago		Boston		Dallas	
	Union	Non-union	Union	Non-union	Union	Non-union	Union	Non-union	Union	Non-union
PBS	4	1	2		1		2			
Private Sector		6		19	20	6	2	6		27

The table shows that Chicago comprises most of the private sector unionized buildings while Atlanta and Dallas comprise most of the non-union sample.

The following chart presents the average maintenance cost per SF for those buildings with union and non-union staff for PBS and private sector:

Average \$/SF by Staff Type



	n
PBS	9
Private Sector	86

The chart shows that:

- ◆ Per SF, PBS maintenance and repair cost for buildings that use union staff is significantly lower than private sector.
- ◆ Per SF, in private sector sample there is a 33-cent (22%) difference between union and non-union employees.

Note: We eliminated three anomalous \$/SF data for private sector for over \$3.00 and \$0.

QUESTION 25

Indicate any building system that has been renovated, replaced or upgraded since the building was constructed.

System	Mark if system has been renovated, replaced or upgraded (check all that apply)	Year of renovation, replacement or upgrade
Elevators		
HVAC		
Electrical		
Structural		
Roof		
Fire/Life Safety		
Lighting		
Plumbing		
Other (specify):		

The following statements summarize findings based on the survey responses:

- ◆ Of all building systems fire/life safety shows the greatest disparity between PBS and private sector:
 - Private sector has upgraded about half of buildings while PBS has upgraded less than a third.
- ◆ PBS does renovate, replace and upgrade consistently with private sector the following building systems:
 - Lighting (about 60%)
 - HVAC (about 50%)
 - Roof (about 40%)
 - Elevators (about 30%)
 - Electrical (about 20%)
 - Structural (about 10%)
 - Plumbing (about 10%)

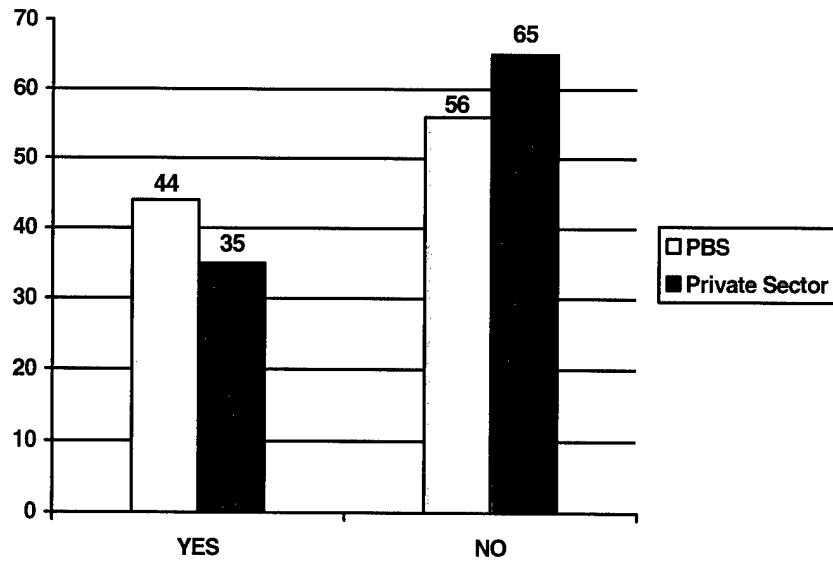
- ◆ In general, for all types of renovations, replacements or upgrades, the average year of renovation is very similar between PBS and private sector:
 - Overall, about 50% to 70% of the time, respondents did not provide the age of renovation, replacement, or upgrade. This leads to conclude that the average year of renovation is actually less recent than it is showing in the following charts.
 - We assumed that blank responses are indicative of older renovations where respondents could not remember the year of renovation, replacement or upgrade.

System	Average Year of Renovation, Replacement or Upgrade	
	PBS	Private Sector
Elevators	1995	1996
HVAC	1997	1997
Electrical	1999	1992
Structural	1998	1994
Roof	1997	1995
Fire/Life Safety	1997	1997
Lighting	1998	1997
Plumbing	1995	1994

The following table summarizes overall survey responses for elevators for both PBS and the private sector:

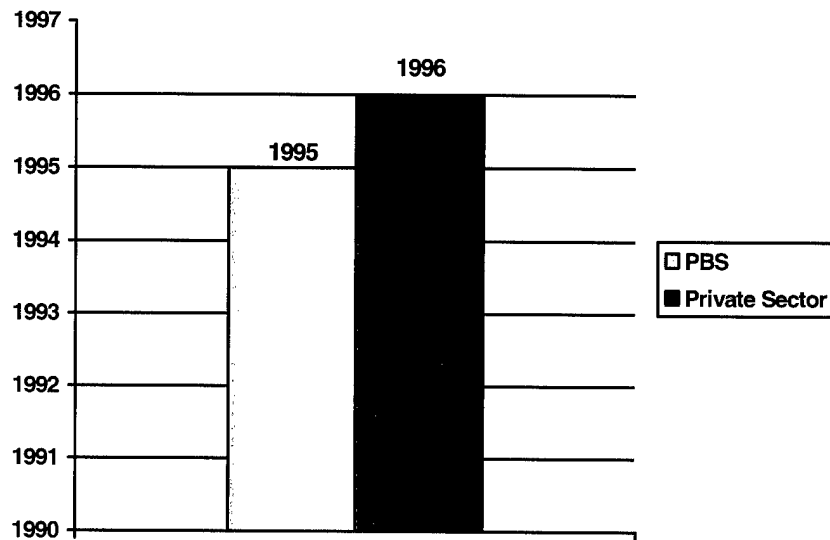
Organization	Number of Responses	Percentage of "Yes" Responses	Percentage of "No" Responses	Average Year of Renovation
PBS	36	16 (44%)	20 (56%)	1995
Private Sector	110	38 (35%)	72 (65%)	1996

Percentage of Responses (Elevators)



	n
PBS	36
Private Sector	110

Average Year of Replacement (Elevators)



	n
PBS	14
Private Sector	30

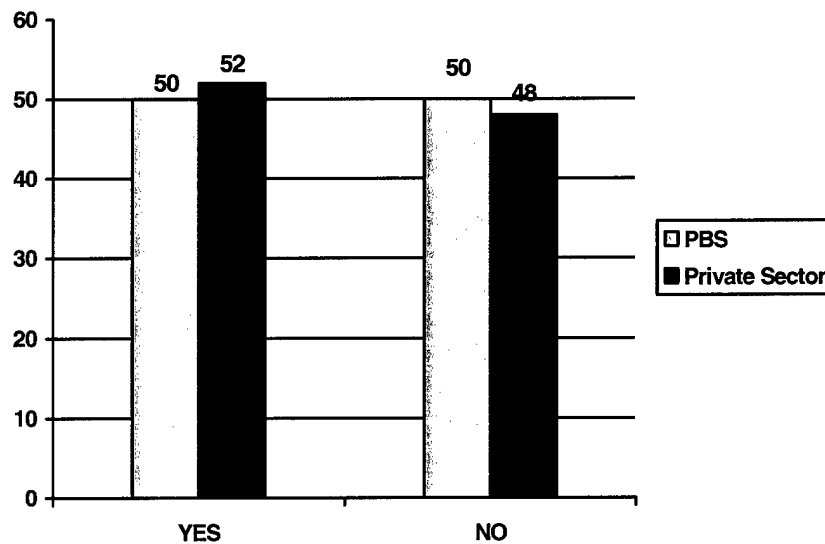
The following table shows the percent of "Yes" responses by different cities for both PBS and private sector:

Organization	Los Angeles	Atlanta	Boston	Chicago	Dallas
PBS	5 (31%)	4 (25%)	1 (6%)	3 (19%)	3 (19%)
Private Sector	4 (10%)	6 (15%)	7 (17%)	9 (27%)	12 (31%)

The following table summarizes overall survey responses for HVAC for both PBS and the private sector:

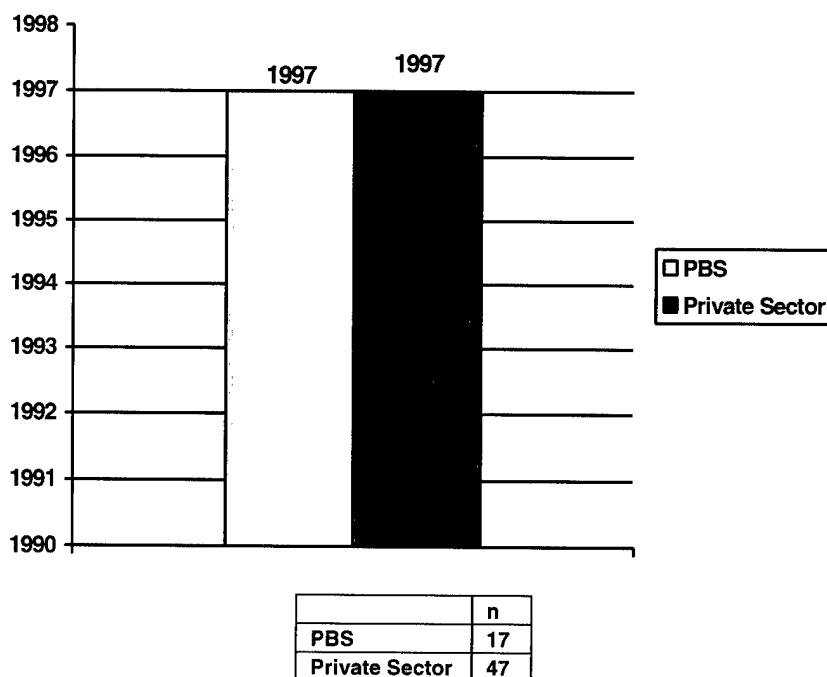
Organization	Number of Responses	Percentage of "Yes" Responses	Percentage of "No" Responses	Average Year of Renovation
PBS	36	18 (50%)	18 (50%)	1997
Private Sector	110	57 (52%)	53 (48%)	1997

Percentage of Responses (HVAC)



	n
PBS	36
Private Sector	110

Average Year of Replacement (HVAC)



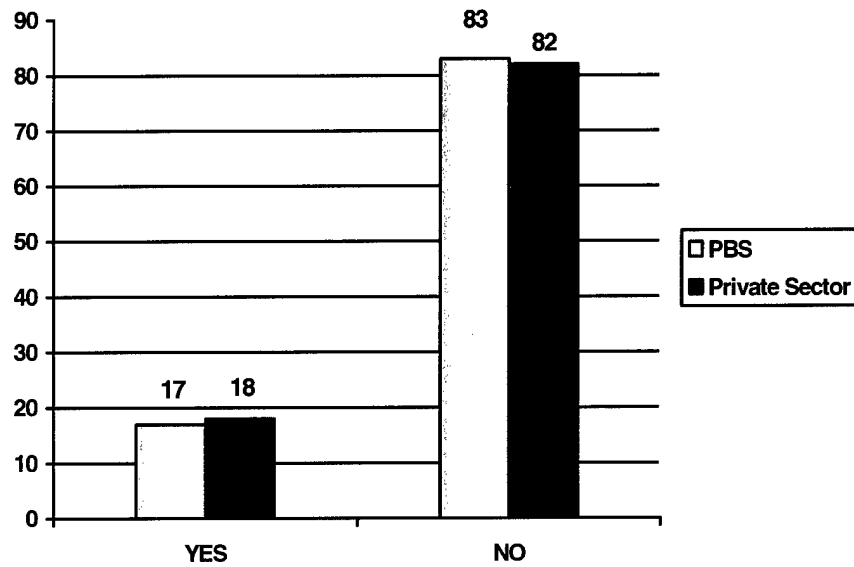
The following table shows the percent of “Yes” responses by different cities for both PBS and private sector:

Organization	Los Angeles	Atlanta	Boston	Chicago	Dallas
PBS	5 (27%)	3 (17%)	3 (17%)	5 (28%)	2 (11%)
Private Sector	6 (11%)	15 (26%)	9 (16%)	15 (26%)	12 (21%)

The following table summarizes overall survey responses for electrical system for both PBS and the private sector:

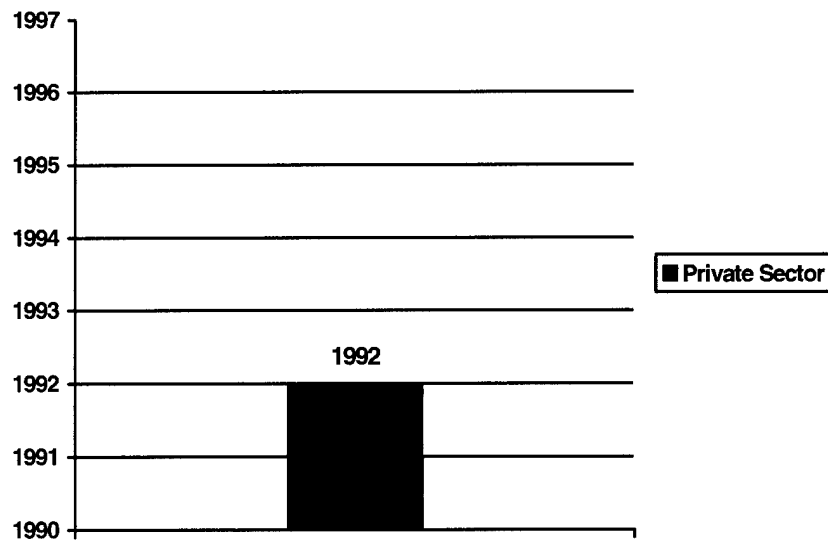
Organization	Number of Responses	Percentage of “Yes” Responses	Percentage of “No” Responses	Average Year of Renovation
PBS	36	6 (17%)	30 (83%)	1999
Private Sector	110	20(18%)	90 (82%)	1992

Percentage of Responses (Electrical)



	n
PBS	36
Private Sector	110

Average Year of Replacement (Electrical)



	n
Private Sector	16

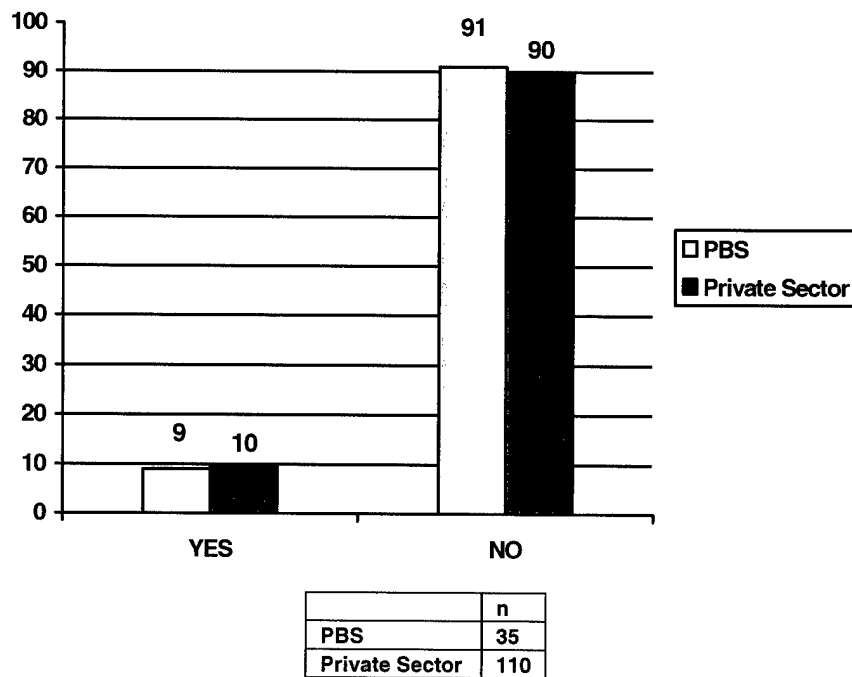
The following table shows the percent of “Yes” responses by different cities for both PBS and private sector:

Organization	Los Angeles	Atlanta	Boston	Chicago	Dallas
PBS	2 (33%)	1 (17%)	1 (17%)	2 (33%)	
Private Sector	1 (5%)	4 (20%)	6 (30%)	5 (25%)	4 (20%)

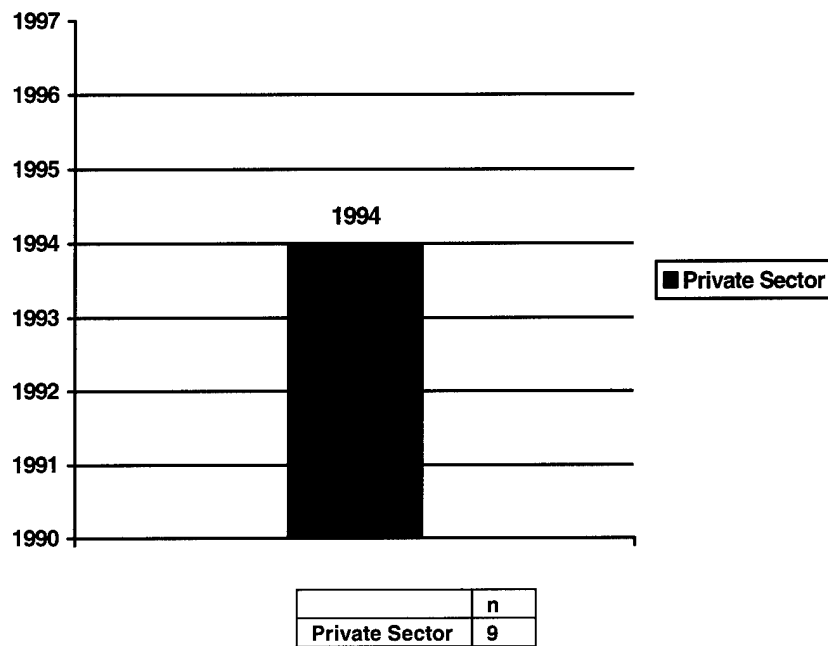
The following table summarizes overall survey responses for structural system for both PBS and the private sector:

Organization	Number of Responses	Percentage of “Yes” Responses	Percentage of “No” Responses	Average Year of Renovation
PBS	35	3 (9%)	32 (91%)	1998
Private Sector	110	10(10%)	100 (90%)	1994

Percentage of Responses (Structural)



Average Year of Replacement (Structural)



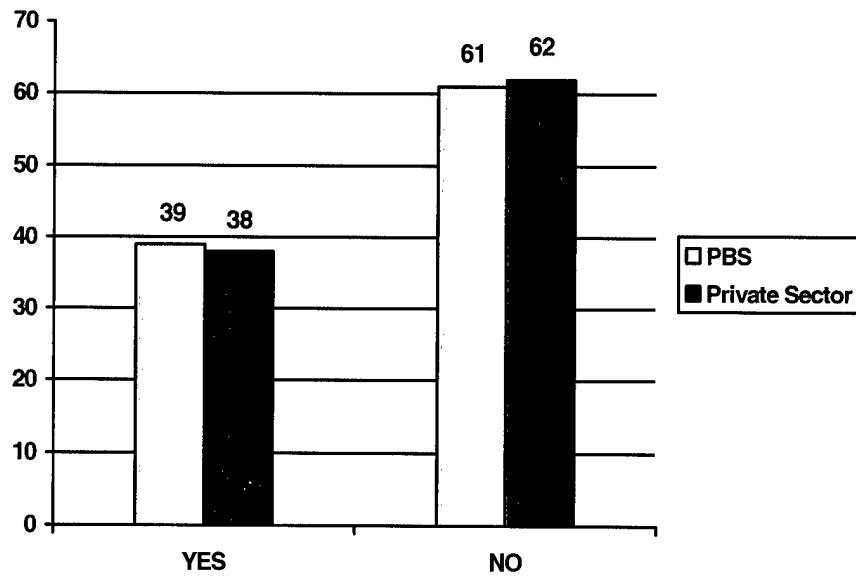
The following table shows the percent of “Yes” responses by different cities for both PBS and private sector:

Organization	Los Angeles	Atlanta	Boston	Chicago	Dallas
PBS	1 (34%)	0	0	2 (66%)	0
Private Sector	1 (10%)	0	5 (50%)	3 (30%)	1 (10%)

The following table summarizes overall survey responses for roof for both PBS and the private sector:

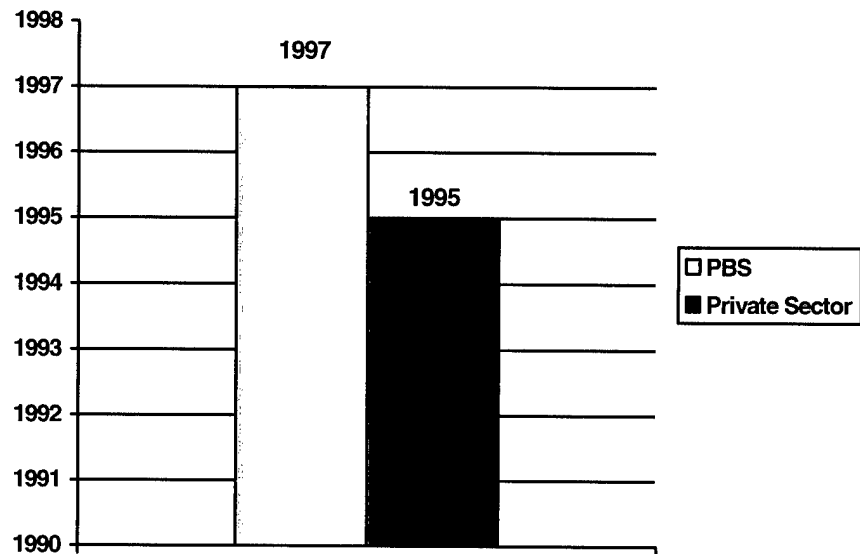
Organization	Number of Responses	Percentage of “Yes” Responses	Percentage of “No” Responses	Average Year of Renovation
PBS	36	14 (39%)	22 (61%)	1997
Private Sector	110	42 (38%)	68 (62%)	1995

Percentage of Responses (Roof)



	n
PBS	36
Private Sector	110

Average Year of Replacement (Roof)



	n
PBS	12
Private Sector	36

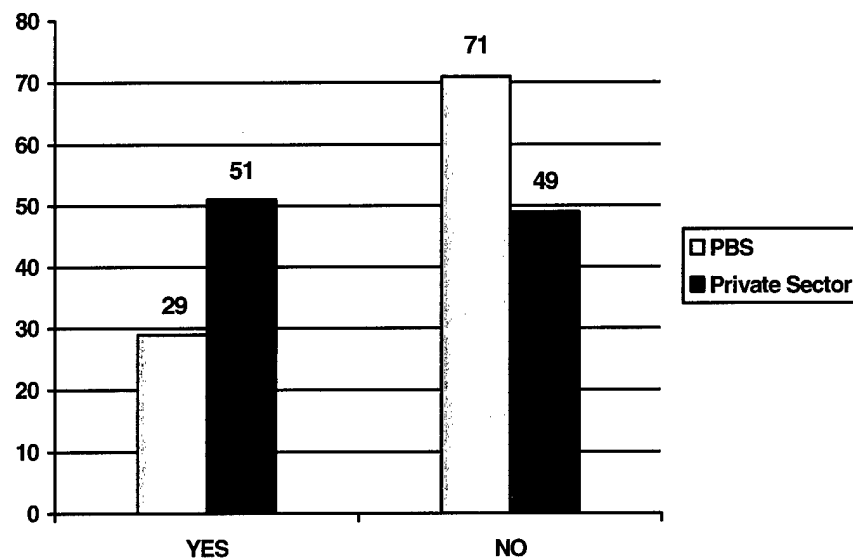
The following table shows the percent of "Yes" responses by different cities for both PBS and private sector:

Organization	Los Angeles	Atlanta	Boston	Chicago	Dallas
PBS	4 (29%)	1 (7%)	5 (36%)	3 (21%)	1 (7%)
Private Sector	6 (14%)	6 (14%)	8 (19%)	12 (29%)	10 (24%)

The following table summarizes overall survey responses for fire/life safety system for both PBS and the private sector:

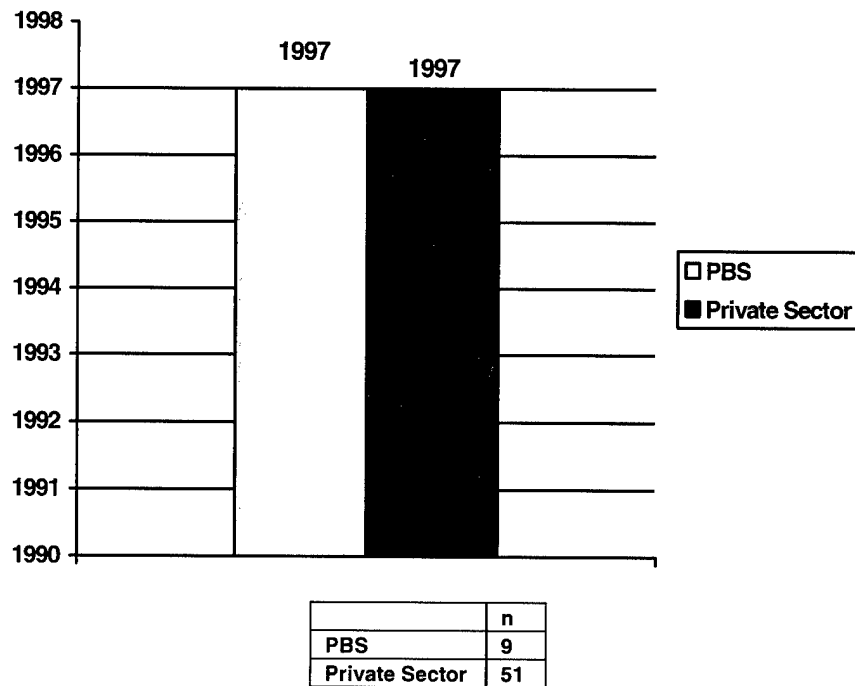
Organization	Number of Responses	Percentage of "Yes" Responses	Percentage of "No" Responses	Average Year of Renovation
PBS	35	10 (29%)	25 (71%)	1997
Private Sector	110	56 (51%)	54 (49%)	1997

Percentage of Responses (Fire/Life Safety)



	n
PBS	35
Private Sector	110

Average Year of Replacement (Fire/Life Safety)



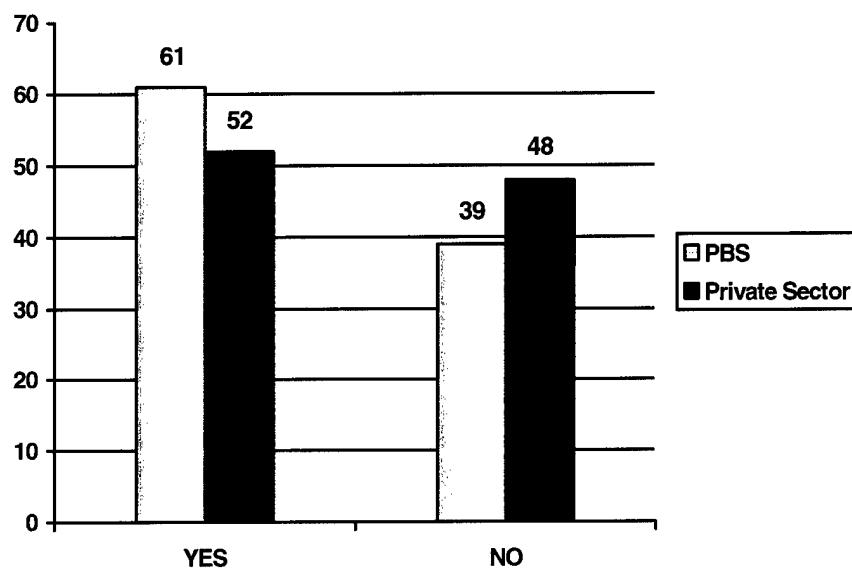
The following table shows the percent of "Yes" responses by different cities for both PBS and private sector:

Organization	Los Angeles	Atlanta	Boston	Chicago	Dallas
PBS	4 (40%)	1 (10%)	1 (10%)	2 (20%)	2 (20%)
Private Sector	6 (11%)	13 (23%)	10 (18%)	17 (30%)	10 (18%)

The following table summarizes overall survey responses for lighting system for both PBS and the private sector:

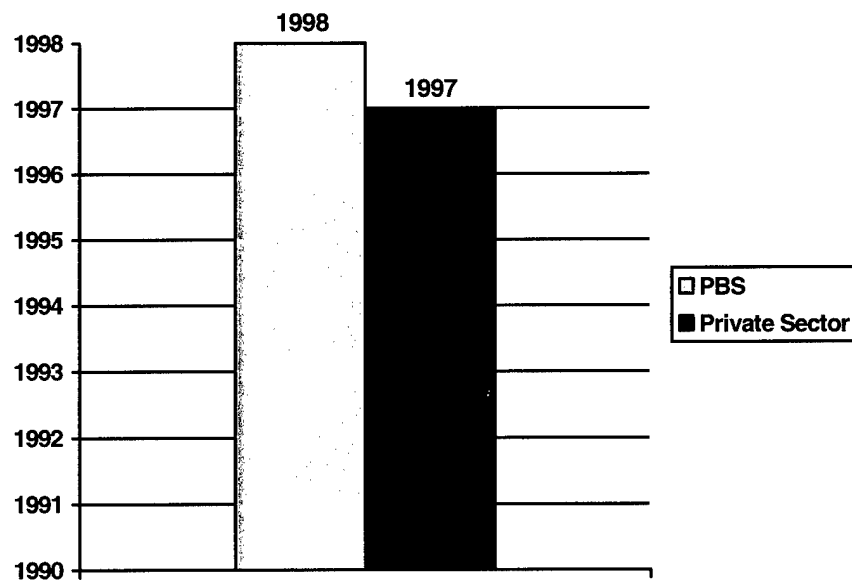
Organization	Number of Responses	Percentage of "Yes" Responses	Percentage of "No" Responses	Average Year of Renovation
PBS	36	22 (61%)	14 (39%)	1998
Private Sector	110	57 (52%)	53 (48%)	1997

Percentage of Responses (Lighting)



	n
PBS	36
Private Sector	110

Average Year of Replacement (Lighting)



	n
PBS	19
Private Sector	46

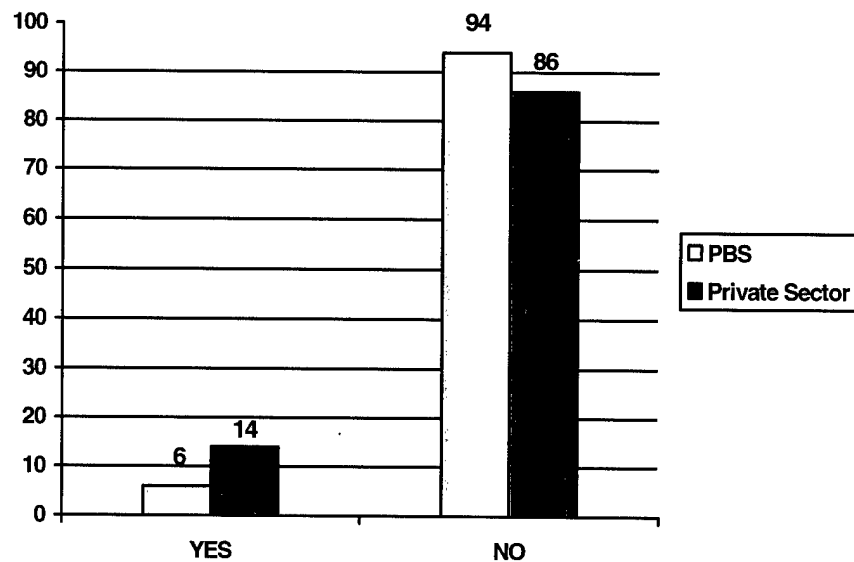
The following table shows the percent of “Yes” responses by different cities for both PBS and private sector:

Organization	Los Angeles	Atlanta	Boston	Chicago	Dallas
PBS	9 (41%)	4 (18%)	4 (18%)	4 (18%)	1 (5%)
Private Sector	8 (14%)	18 (32%)	7 (12%)	12 (21%)	12 (21%)

The following table summarizes overall survey responses for plumbing for both PBS and the private sector:

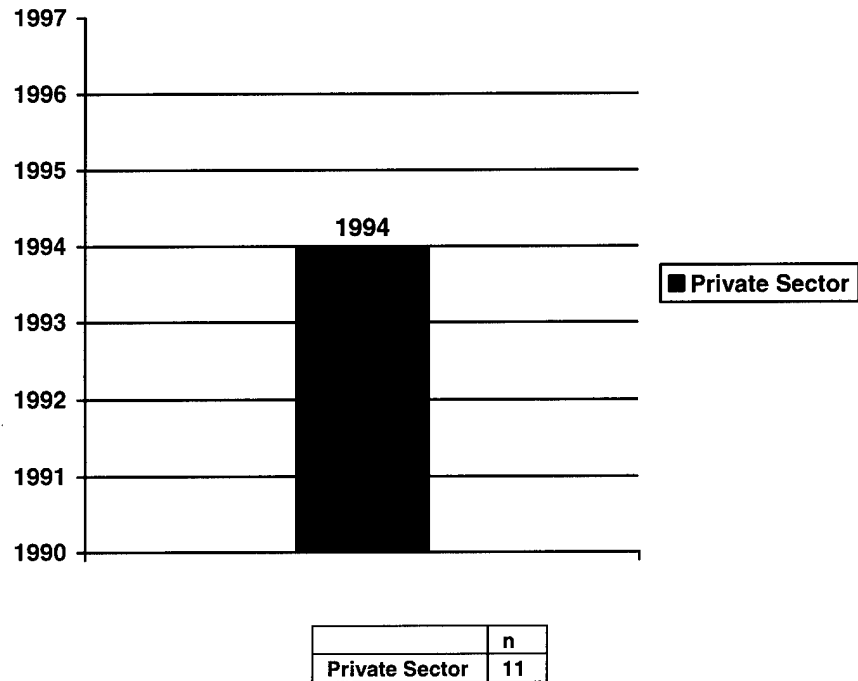
Organization	Number of Responses	Percentage of “Yes” Responses	Percentage of “No” Responses	Average Year of Renovation
PBS	35	2 (6%)	33 (94%)	1995
Private Sector	110	15 (14%)	95 (86)	1994

Percentage of Responses (Plumbing)



	n
PBS	35
Private Sector	110

Average Year of Replacement (Plumbing)



The following table shows the percent of “Yes” responses by different cities for both PBS and private sector:

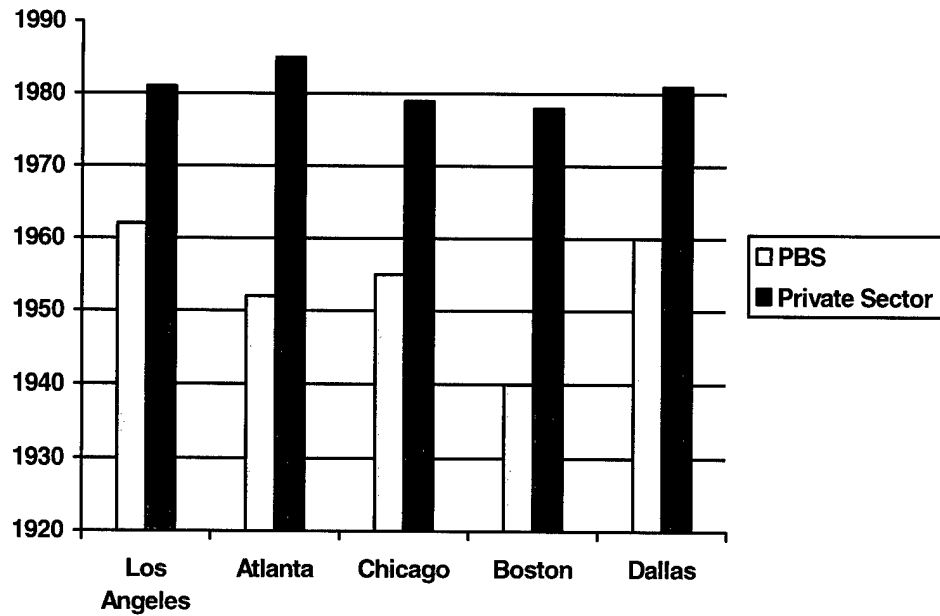
Organization	Los Angeles	Atlanta	Boston	Chicago	Dallas
PBS	0	1 (50%)	1 (50%)	0	0
Private Sector	0	3 (20%)	5 (33%)	7 (47%)	0

As part of our analysis, we also examined the responses to question 16 of the BOMA Experience Exchange report for year building first opened.

The following table and summarizes the average year building first opened by cities for both PBS and private sector buildings:

Cities	Average Year Building Opened	
	Private Sector	PBS
Los Angeles	1981	1962
Atlanta	1985	1952
Chicago	1979	1955
Boston	1978	1940
Dallas	1981	1960
Whole Group	1981	1954

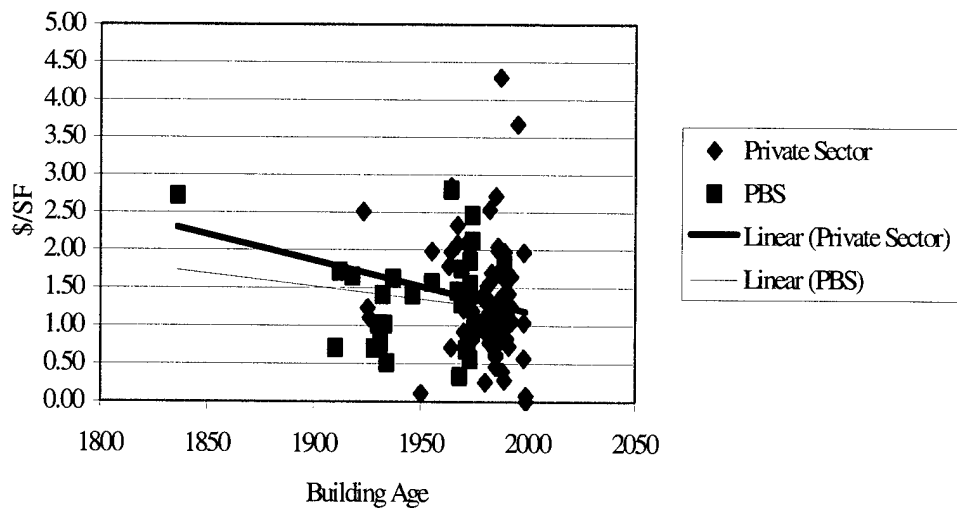
Average Year Opened by City



	n
PBS	33
Private Sector	98

The following chart plots the building age and repair and maintenance unit cost for both PBS and private sector.

Building Age vs. Maintenance & Repair Costs



QUESTION 26

What is the property management liability threshold regarding maintenance and repair costs of major building systems?

\$0- _____

The following table summarizes survey responses to both PBS and private sector. We also examined responses to question 20A of the BOMA Experience Exchange Report that refers to buildings operated by a third party management agency and question 21 of this survey:

Organization	Number of Responses	Median	25th	75th	Average \$/SF
PBS	32	2,500	2,000	10,000	1.55
Private Sector	27	5,000	2,750	10,000	1.16
Q20A "No"	14 (58%)				
Q20A "Yes"	10 (42%)				
Q21: Maintenance & Repair performed by:	In-House: 31% Contractor: 12% Combination: 57%				

From the survey responses, it appears that:

Private sector maintenance and repair costs could tend to be higher than PBS because the private sector threshold is somewhat higher than PBS. However, it does not appear to be a strong influence in the unit cost of maintenance and repair because PBS has a significantly higher unit cost than private sector.

Note: We did not remove any potentially anomalous data points; for example, both PBS and private sector have a few buildings with thresholds of less than \$300. We also cautioned about drawing any conclusions using this data given the small sample size and the large number of non-responses.

QUESTION 27

Are maintenance and repairs above the liability threshold, typically (check one):

___ Performed by the property manager on a reimbursable basis

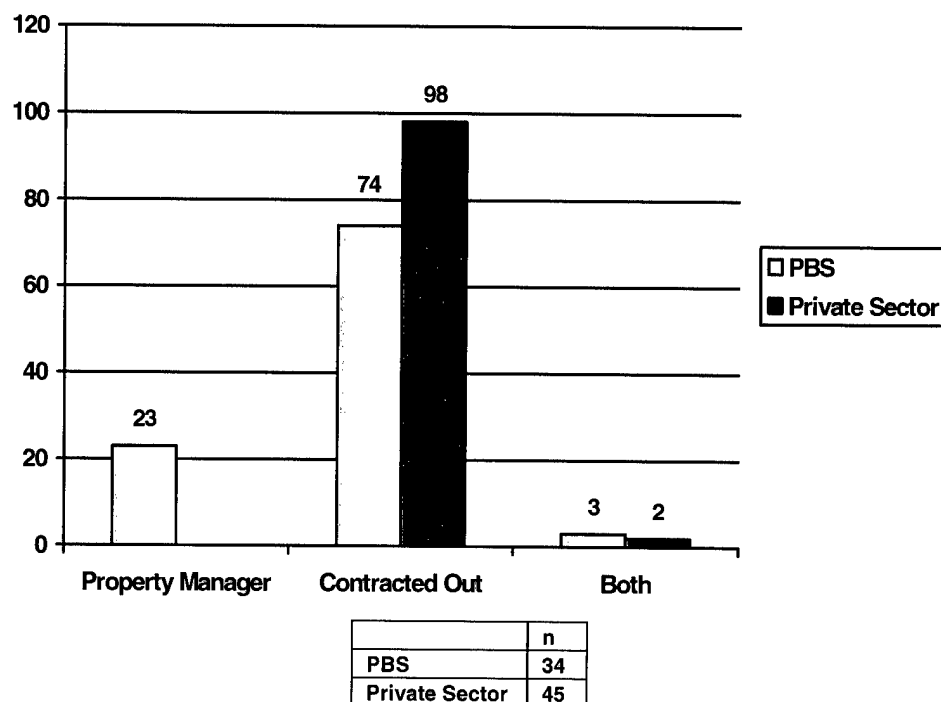
___ Contracted to another company to perform work

___ Other (specify): _____

The following table shows survey responses for both PBS and private sector. We have added responses to question 20A of the BOMA Experience Exchange Report for private sector and question 21 of this survey:

Organization	Number of Responses	Performed by Property Manager	Contracted to Another Company	Both
PBS	34	8 (23%)	25 (74%)	1 (3%)
Private Sector	45	0	44 (98%)	1 (2%)
Q20A "No"	22 (52%)			
Q20A "Yes"	20 (48%)			
Q21: Maintenance & Repair performed by:	In-House: 27% Contractor: 14% Combination: 59%			

Percentage of Responses by Maintenance & Repairs



From the survey responses, we can conclude that both PBS and private sector generally contract to another company to perform work when maintenance and repairs are above the liability threshold.

QUESTION 28

At what dollar threshold are repair costs capitalized rather than expensed? \$ _____

The following table shows survey responses for both PBS and private sector:

Organization	Number of Responses	Median	25th	75th	Average \$/SF
PBS	21	10,000	10,000	10,000	1.42
Private Sector	47	5,000	4,000	12,500	1.31

Based on the survey responses we can conclude that:

- ◆ Because private sector has a lower expense threshold than PBS, private sector is more likely to capitalize repairs, which could result in lower unit cost of maintenance and repair relative to PBS.
- ◆ This tendency is supported by the actual maintenance and repair cost experienced by PBS and private sector.

QUESTON 29

What is the negotiated service call response time for O&M contracts (indicate unit of measure for each category)?

Emergency _____

Urgent _____

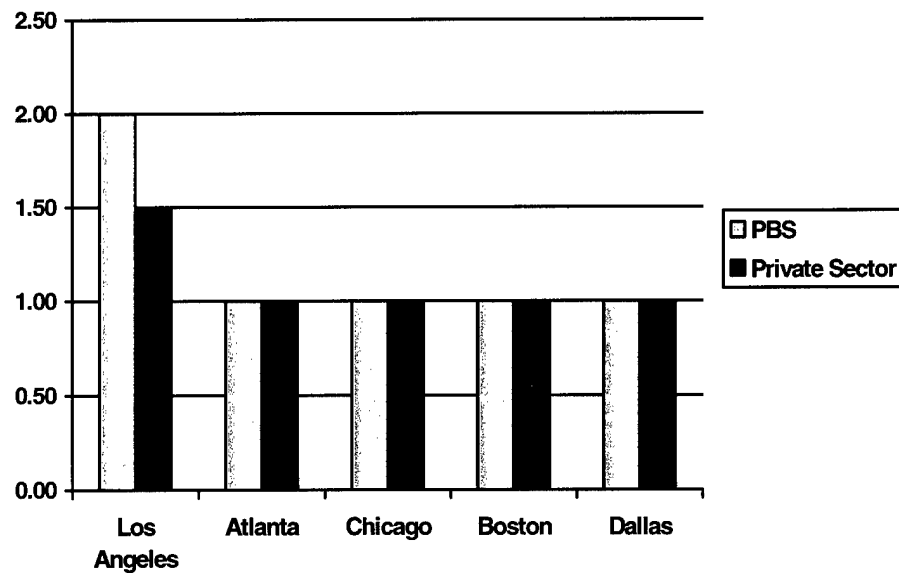
Routine _____

The following table summarizes survey responses for both PBS and private sector:

Organization	Number of Responses	Median Emergency Call	Range	Median Urgent Call	Range	Median Routine Call	Range
PBS	34	1 Hour	1-2	1 Hour	1-1	13 Hours	1-24
Private Sector	59	1 Hours	1-24	2 Hours	1-48	24 Hours	1-192

The following chart illustrates the median response time for emergency service calls by cities for both PBS and private sector:

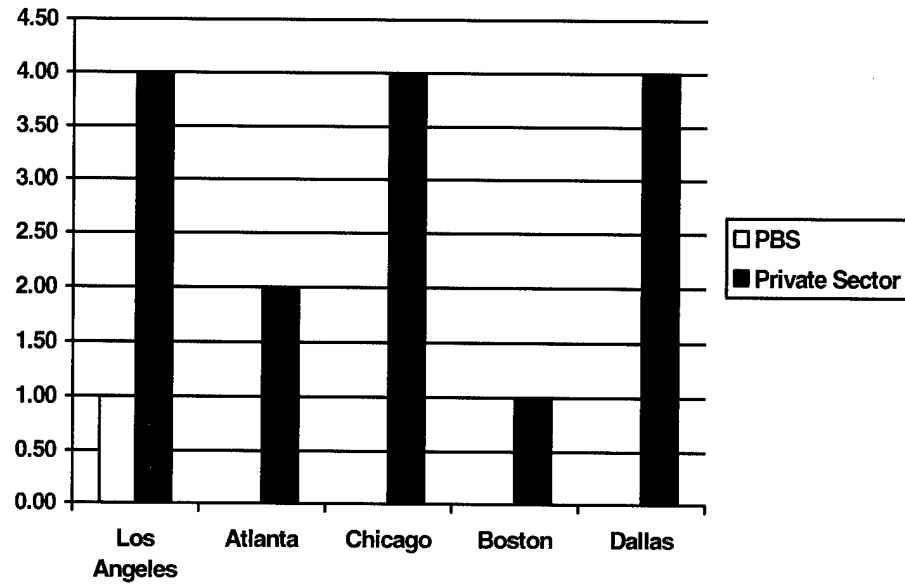
Median Number of Hours by City



	n
PBS	34
Private Sector	57

The following chart illustrates the median response time for urgent service calls by cities for both PBS and private sector:

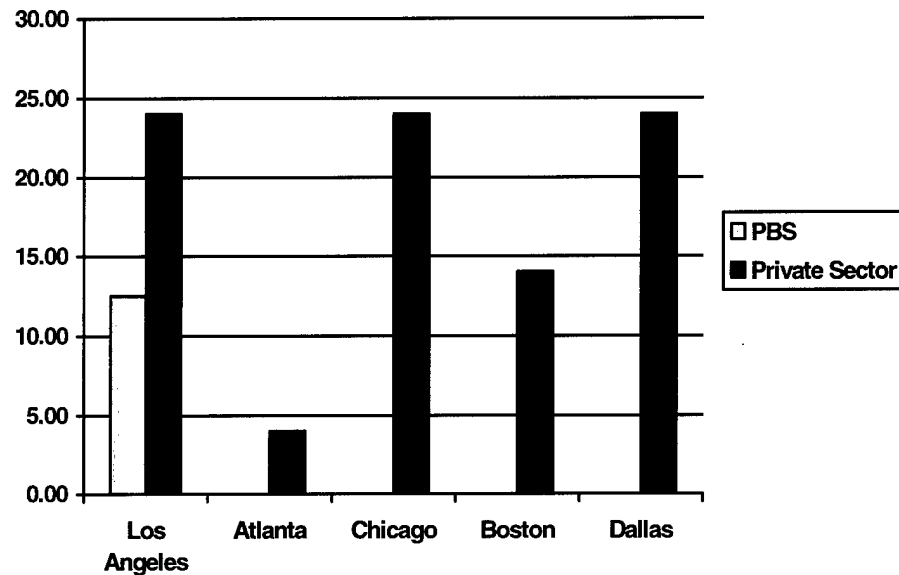
Median Number of Hours by City



	n
PBS	2
Private Sector	54

The following chart illustrates the median response time for routine service calls by cities for both PBS and private sector:

Median Number of Hours by City



	n
PBS	2
Private Sector	51

The following table shows median response time for urgent and routine call by cities for both PBS and private sector:

City	Median Urgent Call		Median Routine Call	
	PBS	Private Sector	PBS	Private Sector
Los Angeles	1	4	12.50	24
Atlanta		2		4
Chicago		4		24
Boston		1		14
Dallas		4		24

The following tables show survey responses for both PBS and private sector:

PBS Survey ID	Emergency	Urgent	Routine
CA0150CC	1	1	24
CA0168ZZ	1		
CA0224ZZ	2		
CA0283CC	1	1	1
GA0087AD	1		
GA0121ZZ	1		
GA0125ZZ	1		
GA0501AA	1		
IL0054ZZ	1		
IL0205ZZ	1		
IL0209CF	1		
IL0235FC	1		
IL0236FC	1		
MA0050ZZ	1		
MA0131ZZ	1		
MA0138ZZ	1		
CA0041ZZ	2		
CA0149ZZ	2		
CA0185ZZ	2		
CA9551RR	2		
MA0011ZZ	1		
MA0013ZZ	1		
MA0076ZZ	1		
MA0135ZZ	1		
MA0158ZZ	1		
IL0032ZZ	1		
IL0231ZZ	1		
IL0303ZZ	1		
TX0057ZZ	1		
TX0058DA	1		
TX0200ZZ	1		
TX0284DA	1		
TX0292ZZ	1		
TX0302ZZ	1		

BOMA Survey ID	Emergency	Urgent	Routine
12840	1	1	24
13852	2	24	24
20300	1	1	24
26056	2	2	24
26436	1	1	1
28301	1	2	4
28302	1	2	4
28303	1	2	4
28314	1	2	4
28315	1	2	4
28316	1	2	4
29079	1	1	1
29473	1	1	24
29592	2	48	192
40361	1	2	24
18811	1	1	4
29423	1	24	72
29424	1	4	120
40064	1	1	2
40275	2		
40437	1	1	24
9320	1	1	4
1251	2	4	48
13030	1	8	24
13670	1	2	3
15818	1	1	24
20035	4		4
20538	1	4	24
21803	1	2	24
21900	1	4	24
26105	1	1	24
26156	3	3	24
2710	1	1	3
27128	1	1	4
28055	1	2	3
29118	4	4	8
29808	1	8	24
40108	24	24	72

BOMA Survey ID	Emergency	Urgent	Routine
8224	2	4	24
9317	1	6	168
13534		1	1
14097	2	4	24
17753	1	5	24
18464	1	2	
2373	2	4	24
25015	1	24	48
28716	1	4	
29088	1	24	
40204		1	1
5399	1	4	
6034	3	4	8
17690	1	1	24
26157	2	4	48
27057	4	24	24
27060	4		
3297	3	8	24
5221	1	1	24
5222	1	1	24
8581	1	4	24

QUESTION 30

Do you perform preventative maintenance (PM) on any of your building systems (check all that apply)?

System	Indicate if system receives PM (check all that apply)	Number of times per year
Elevators HVAC (chiller, air handler, cooling tower, etc.) Electrical Structural Roof Fire/Life Safety Lighting Plumbing Other (specify):		

From the table above we can examine the frequency variation between PBS and private sector buildings:

- ◆ Both PBS and private sector perform preventative maintenance (PM) on elevators and HVAC systems in the same percent of buildings and with the same frequency.
- ◆ Both PBS and private sector perform preventative maintenance (PM) on structural systems in a few buildings.
- ◆ PBS performs preventative maintenance (PM) on electrical, structural, roof and fire/life safety systems in more buildings and more frequently than private sector.
- ◆ PBS performs preventative maintenance (PM) on lighting and plumbing in more buildings but not more frequently than private sector.

The following table indicates the frequency preventative maintenance (PM) is performed on building systems for both PBS and private sector:

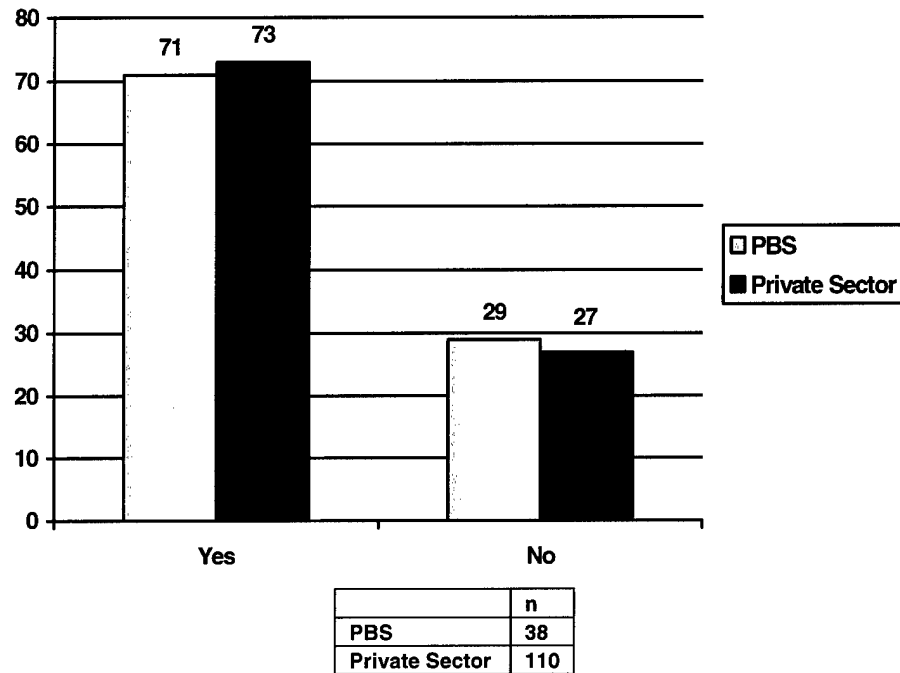
Function	Yes/No	PBS	Private Sector
Elevators	PBS and private sector performs this function at 70% of the buildings	once a month (64%)	once a month (63%)
HVAC	PBS and private sector performs this function at 95% of the buildings	quarterly or monthly (50%)	quarterly or monthly (71%)

Function	Yes/No	PBS	Private Sector
Electrical	PBS buildings performs this function at 90% of its buildings while private sector does it at 65%	50% quarterly	82% once or twice a year
Structural	Few PBS and private sector buildings perform this function	twice a year or quarterly (54%)	once a year (71%)
Roof	PBS performs this function in more buildings than private sector (70% versus 54%)	twice a year or quarterly (71%)	once or twice a year (71%)
Fire/Life Safety	PBS performs this function in more buildings than private sector (97% versus 79%)	quarterly or monthly (88%)	twice a year or quarterly (56%)
Lighting	PBS performs this function in more buildings than private sector (72% versus 43%)	once or twice a year (61%)	once a month or every day (71%)
Plumbing	PBS performs this function in more buildings than private sector (65% versus 49%)	once a year or quarterly (68%)	twice a year or every month (65%)

The following table illustrates survey responses for both PBS and the private sector for elevator system:

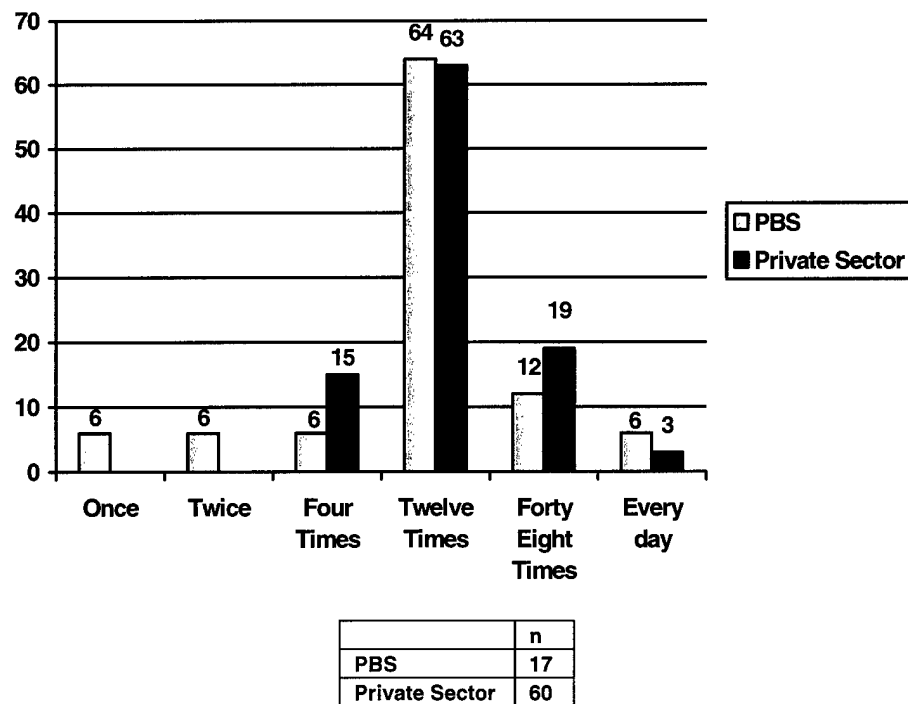
Organization	Number of Responses	Percentage of "Yes" Responses	Percentage of "No" Responses
PBS	38	27 (71%)	11 (29%)
Private Sector	110	80 (73%)	30 (27%)

Percentage of Responses



The following chart demonstrates responses to the number of times per year elevators receive PM for both PBS and private sector:

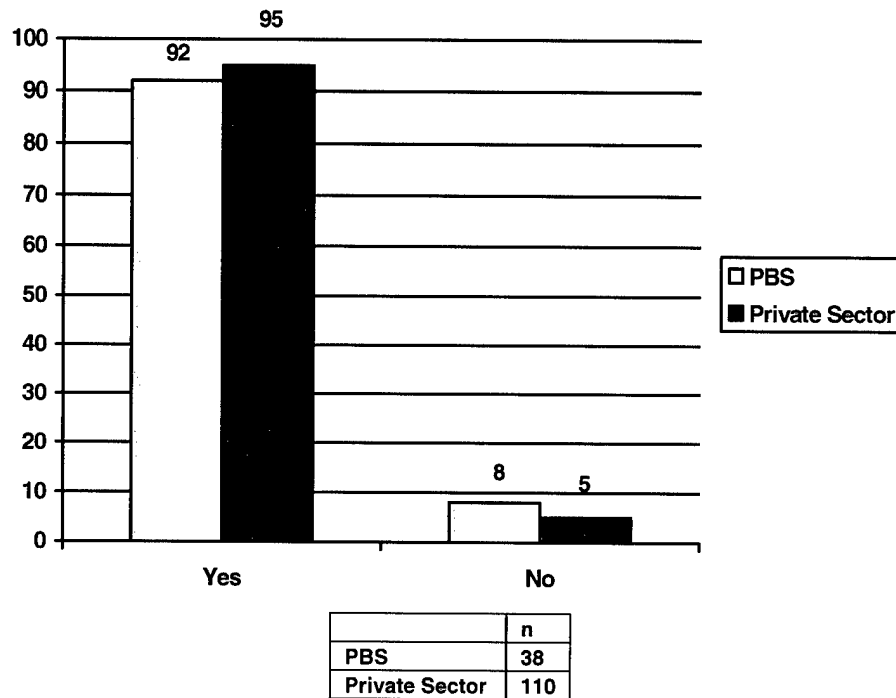
Percentage of Responses by Times Per Year



The following table illustrates survey responses for both PBS and the private sector for HVAC:

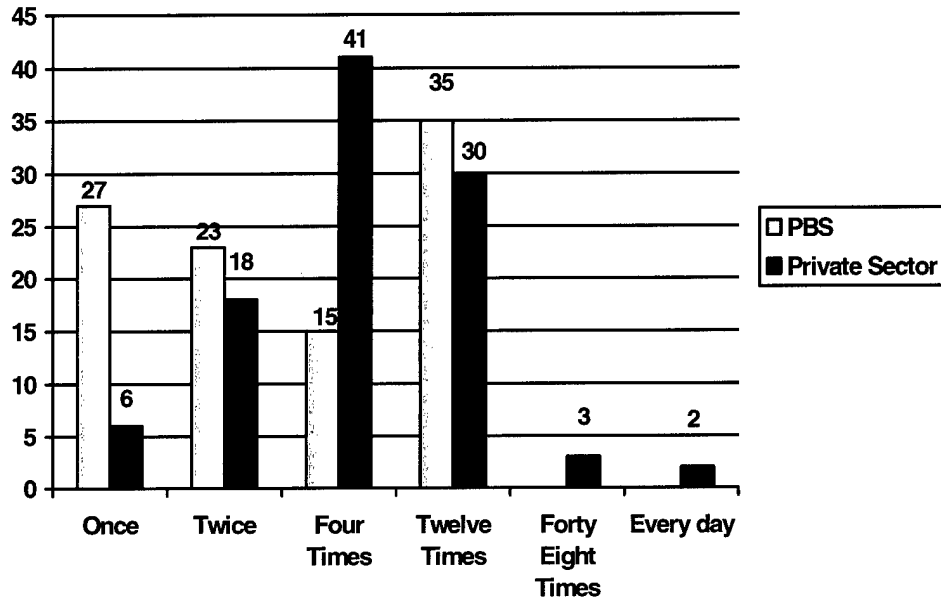
Organization	Number of Responses	Percentage of "Yes" Responses	Percentage of "No" Responses
PBS	38	35 (92%)	3 (8%)
Private Sector	110	104 (95%)	6 (5%)

Percentage of Responses (HVAC)



The following chart demonstrates responses to the number of times per year HVAC receives PM for both PBS and private sector:

Percentage of Responses by Times Per Year

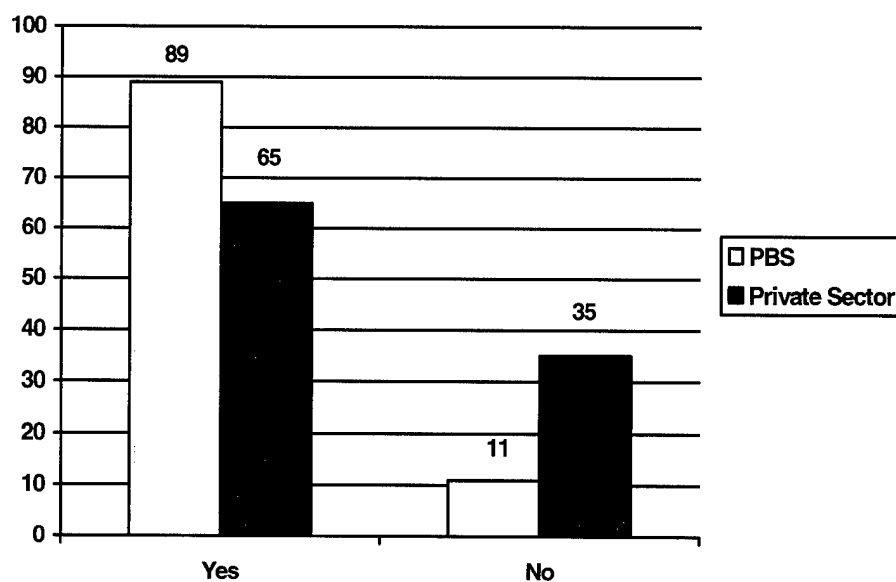


	n
PBS	26
Private Sector	88

The following table illustrates survey responses for both PBS and the private sector for electrical system:

Organization	Number of Responses	Percentage of "Yes" Responses	Percentage of "No" Responses
PBS	38	34 (89%)	4 (11%)
Private Sector	110	72 (65%)	38 (35%)

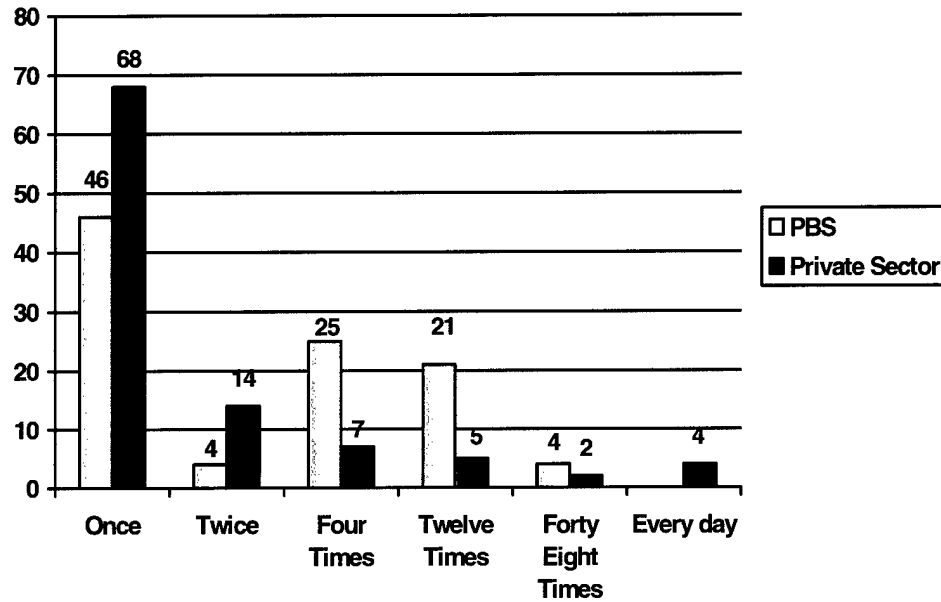
Percentage of Responses (Electrical)



	n
PBS	38
Private Sector	110

The following chart demonstrates responses to the number of times per year electrical system receives PM for both PBS and private sector:

Percentage of Responses (Electrical)

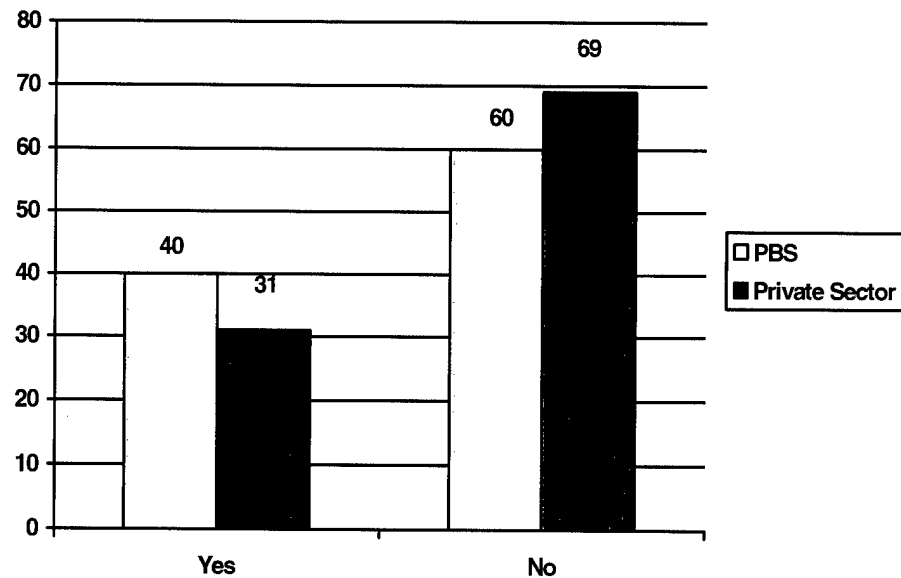


	n
PBS	24
Private Sector	57

The following table illustrates survey responses for both PBS and the private sector for structural system:

Organization	Number of Responses	Percentage of "Yes" Responses	Percentage of "No" Responses
PBS	35	14 (40%)	21 (60%)
Private Sector	110	34 (31%)	76 (69%)

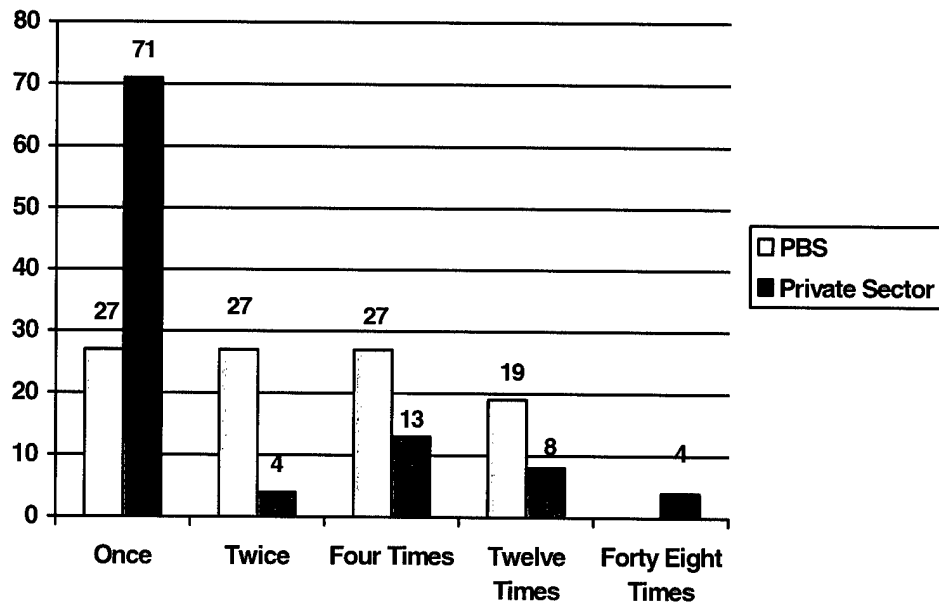
Percentage of Responses (Structural)



	n
PBS	35
Private Sector	11

The following chart demonstrates responses to the number of times per year structural system receives PM for both PBS and private sector:

Percentage of Responses by Times Per Year

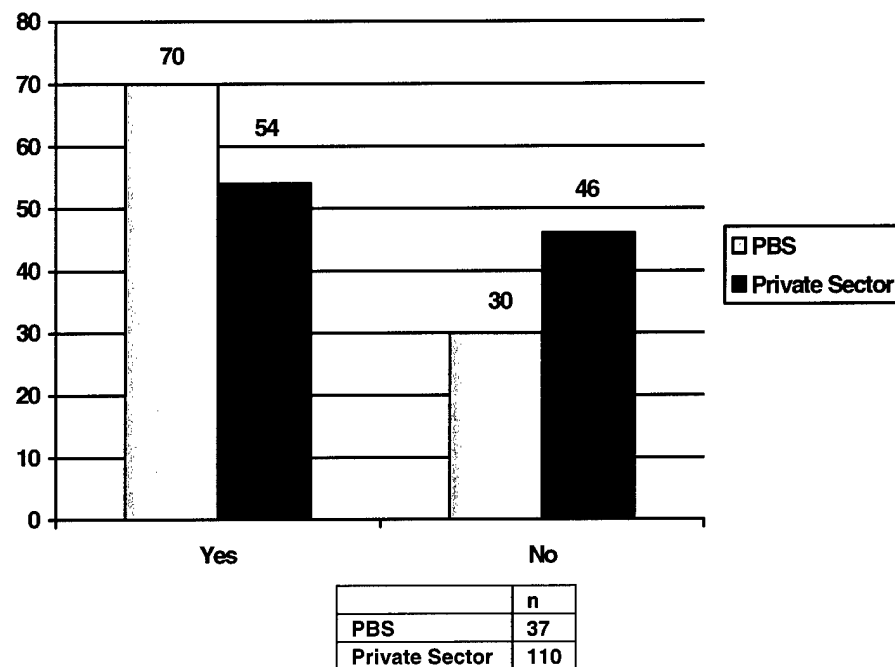


	n
PBS	11
Private Sector	24

The following table illustrates survey responses for both PBS and the private sector for roof:

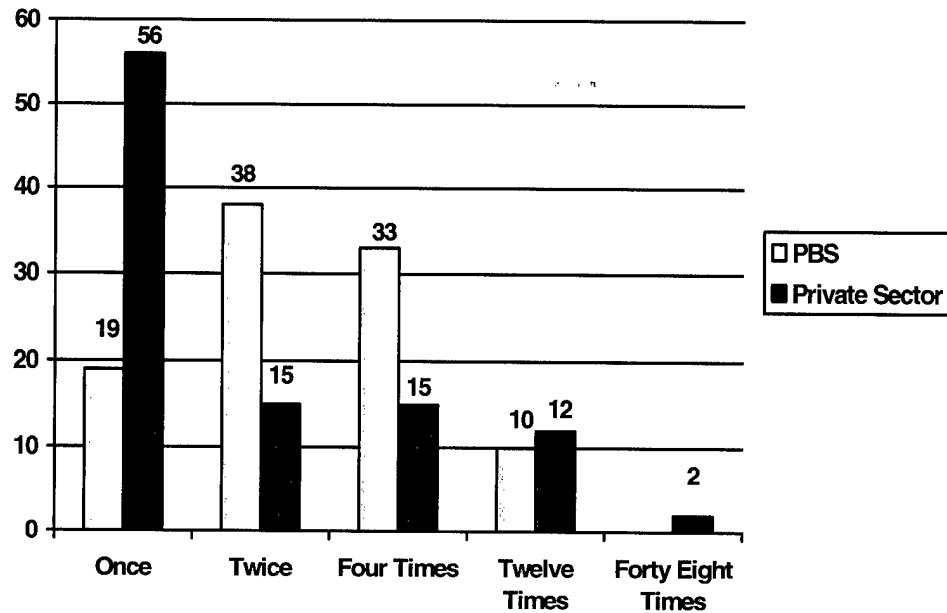
Organization	Number of Responses	Percentage of "Yes" Responses	Percentage of "No" Responses
PBS	37	26 (70%)	11 (30%)
Private Sector	110	59 (54%)	51 (46%)

Percentage of Responses (Roof)



The following chart demonstrates responses to the number of times per year roofs receive PM for both PBS and private sector:

Percentage of Responses by Times Per Year (Roof)

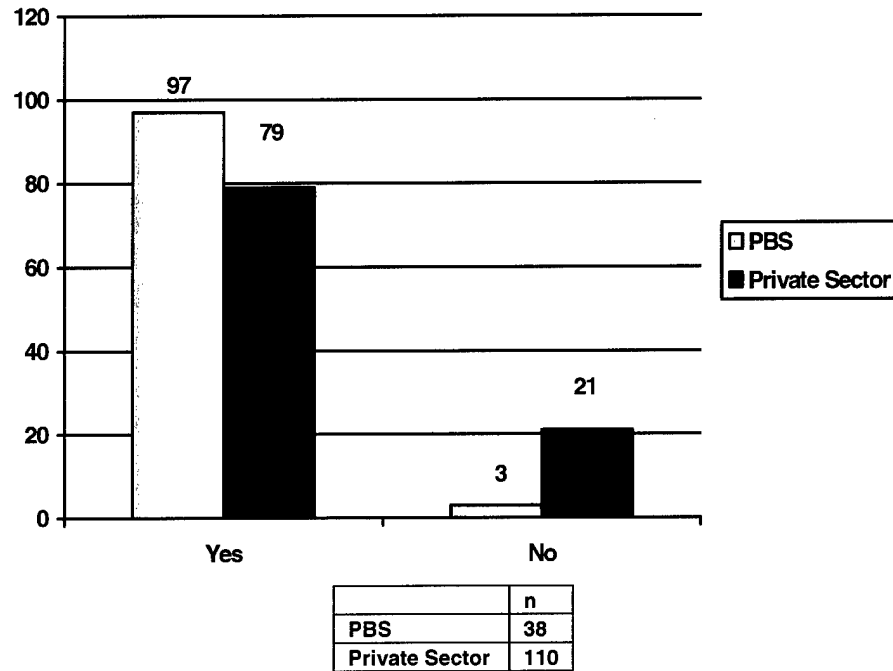


	n
PBS	21
Private Sector	48

The following table illustrates survey responses for both PBS and the private sector for fire/life safety system:

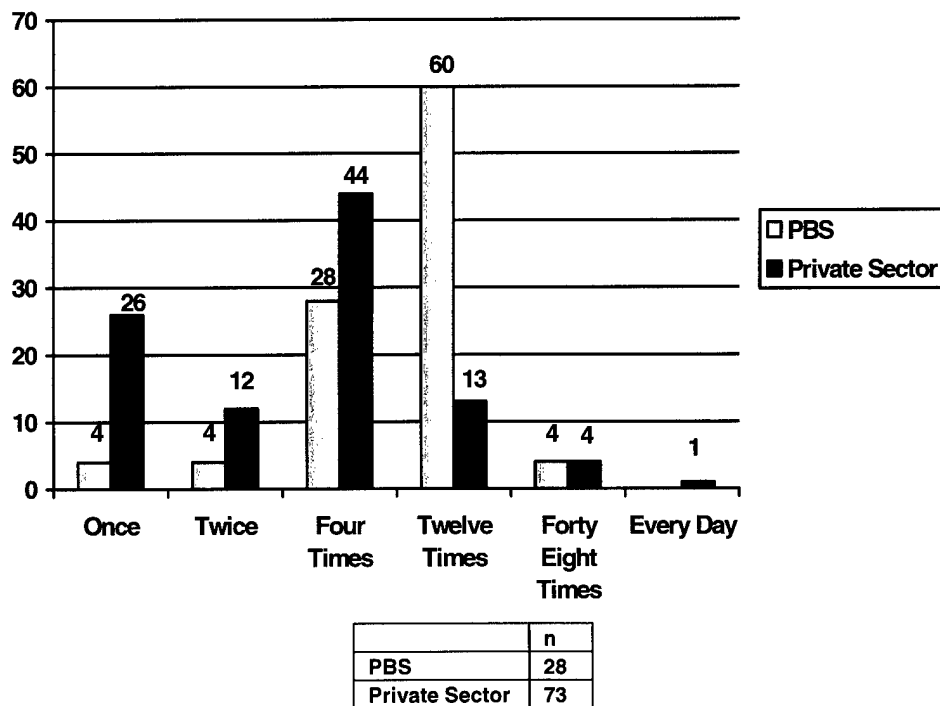
Organization	Number of Responses	Percentage of "Yes" Responses	Percentage of "No" Responses
PBS	38	37 (97%)	1 (3%)
Private Sector	110	87 (79%)	23 (21%)

Percentage of Responses (Fire/Life Safety)



The following chart demonstrates responses to the number of times per year fire/life safety systems receive PM for both PBS and private sector:

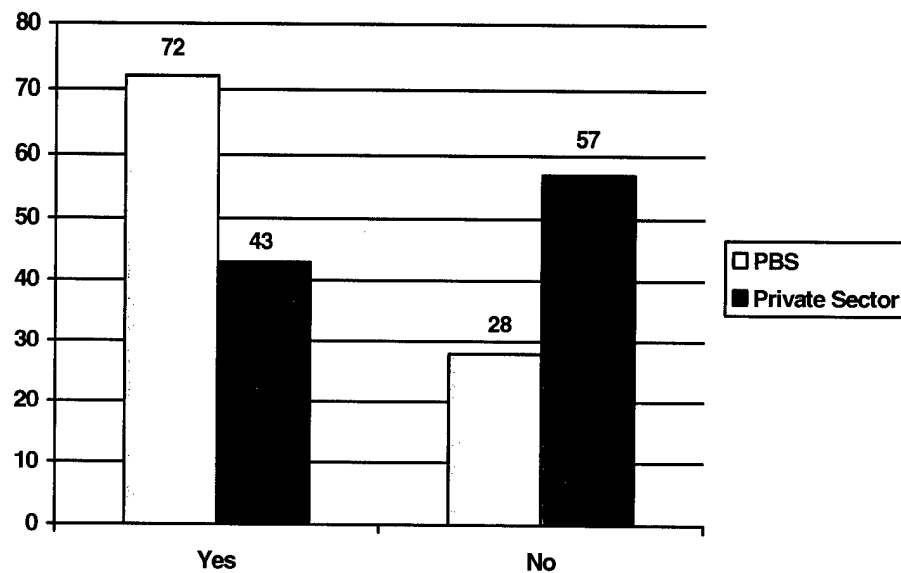
Percentage of Responses by Times Per Year



The following table illustrates survey responses for both PBS and the private sector for lighting system:

Organization	Number of Responses	Percentage of "Yes" Responses	Percentage of "No" Responses
PBS	36	26 (72%)	10 (28%)
Private Sector	110	47 (43%)	63 (57%)

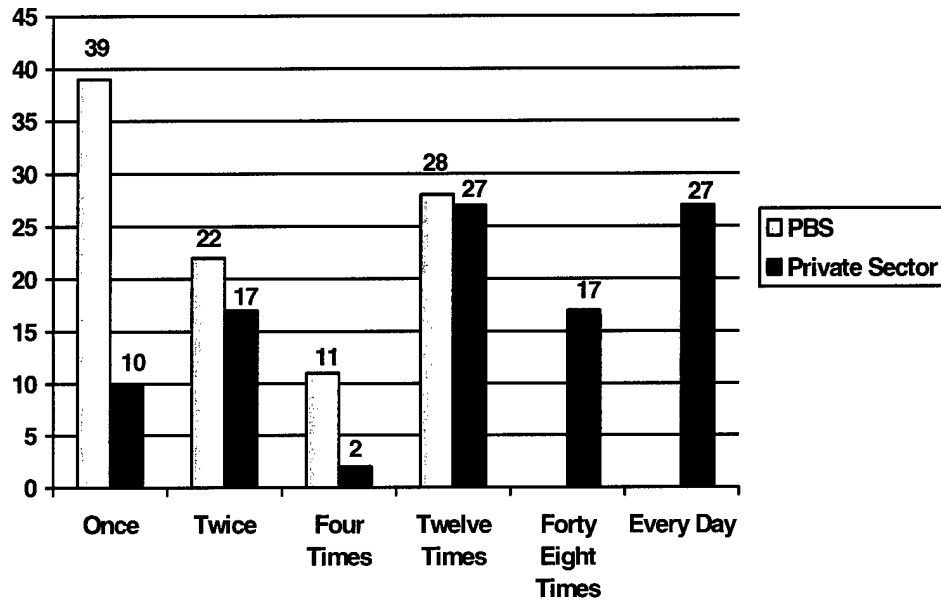
Percentage of Responses (Lighting)



	n
PBS	36
Private Sector	110

The following chart demonstrates responses to the number of times per year lighting systems receive PM for both PBS and private sector:

Percentage of Responses (Plumbing)

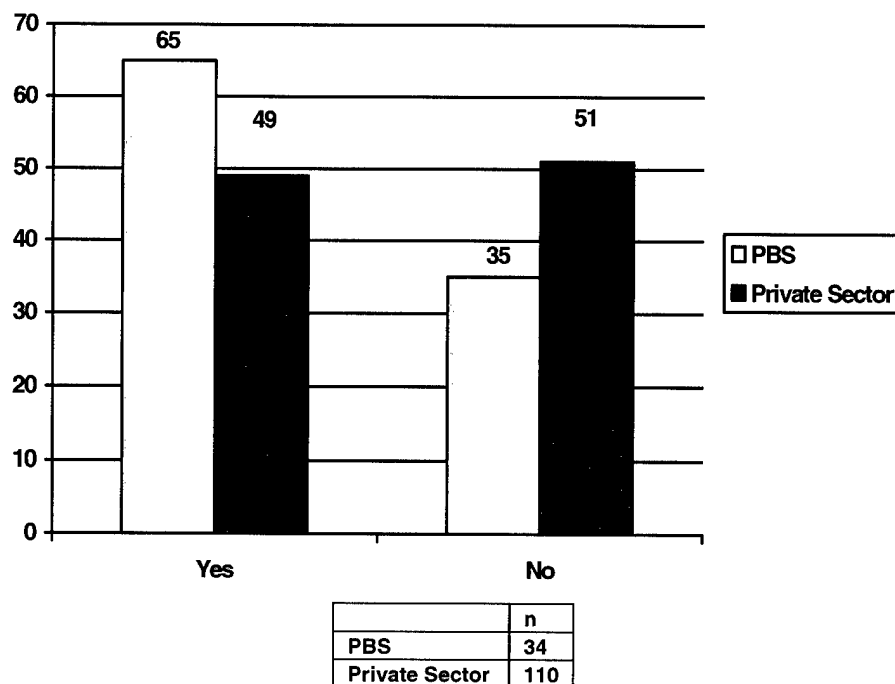


	n
PBS	18
Private Sector	30

The following table illustrates survey responses for both PBS and the private sector for plumbing system:

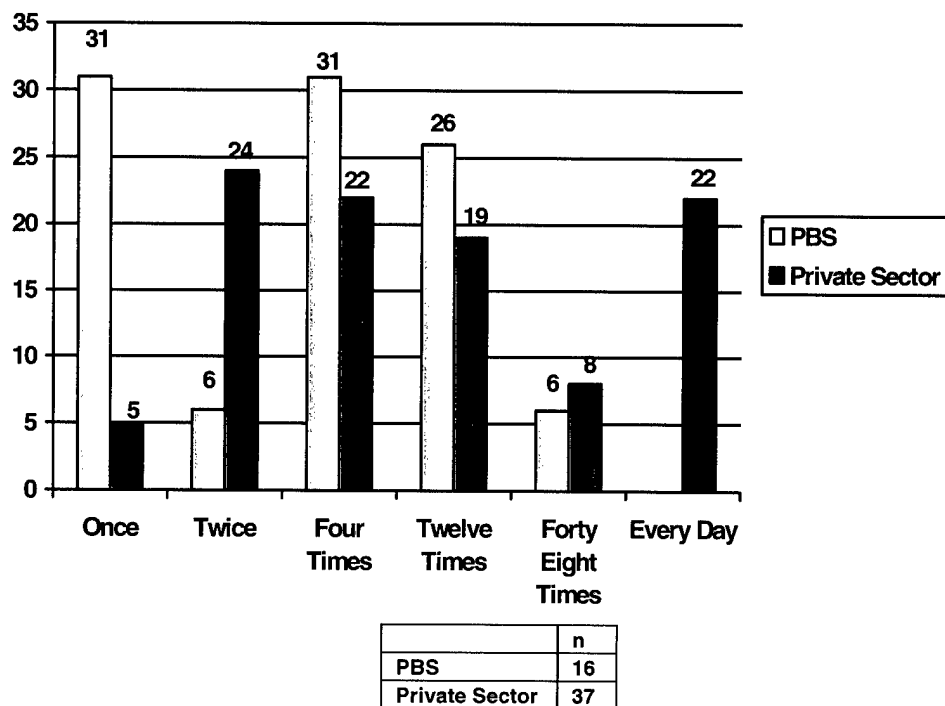
Organization	Number of Responses	Percentage of "Yes" Responses	Percentage of "No" Responses
PBS	34	22 (65%)	12 (35%)
Private Sector	110	54 (49%)	56 (51%)

Percentage of Responses (Plumbing)



The following chart demonstrates responses to the number of times per year plumbing systems receive PM for both PBS and private sector:

Percentage of Responses by Times Per Year



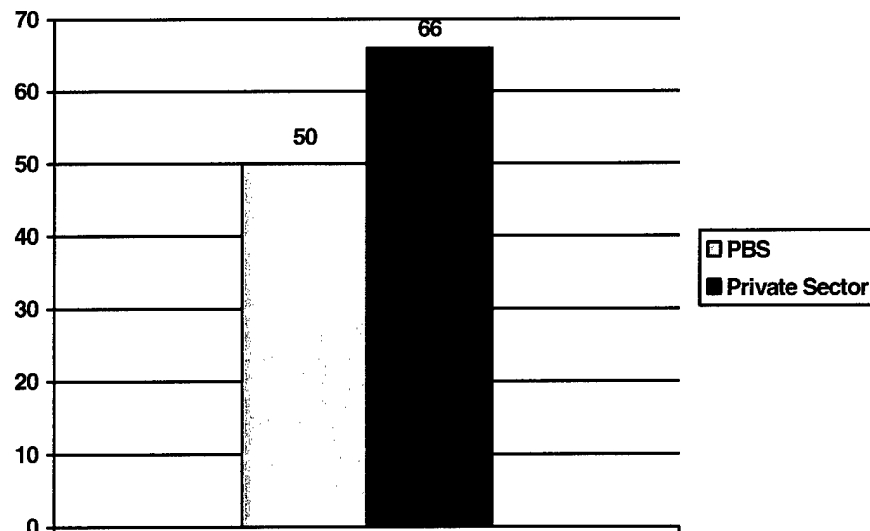
QUESTION 31

Number of elevator door openings: _____

The following chart summarizes survey responses for both PBS and private sector:

Organization	Number of Responses	Average Number of Elevator Door Openings
PBS	30	50
Private Sector	99	66

Average Number of Responses



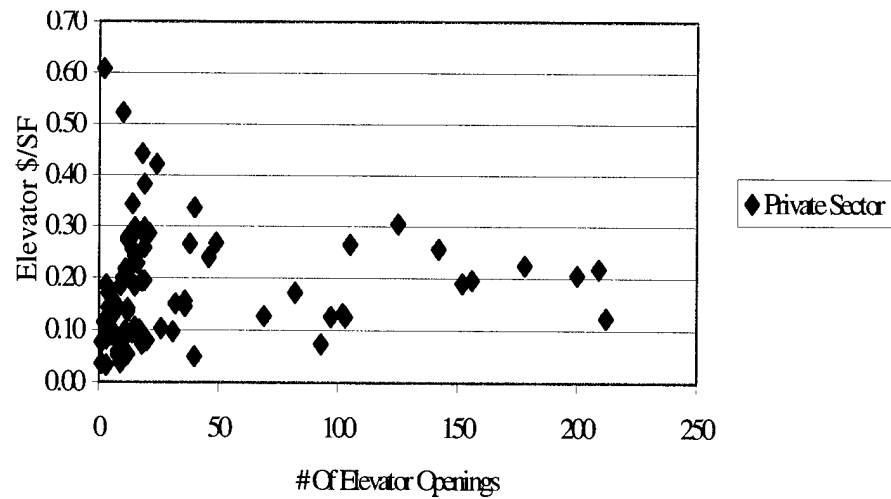
	n
PBS	30
Private Sector	99

The following chart shows average number of elevator door openings by cities for PBS and private sector:

Organization	Los Angeles	Atlanta	Chicago	Boston	Dallas
PBS	48	122	17	66	8
Private Sector	24	127	96	28	30

The following chart plots the number of elevator openings and elevator repair and maintenance unit costs for private sector only:

Number of Elevator Openings vs. Elevators Maintenance & Repair Cost



QUESTION 32

Type of elevators (check one):

___ Gear/Traction

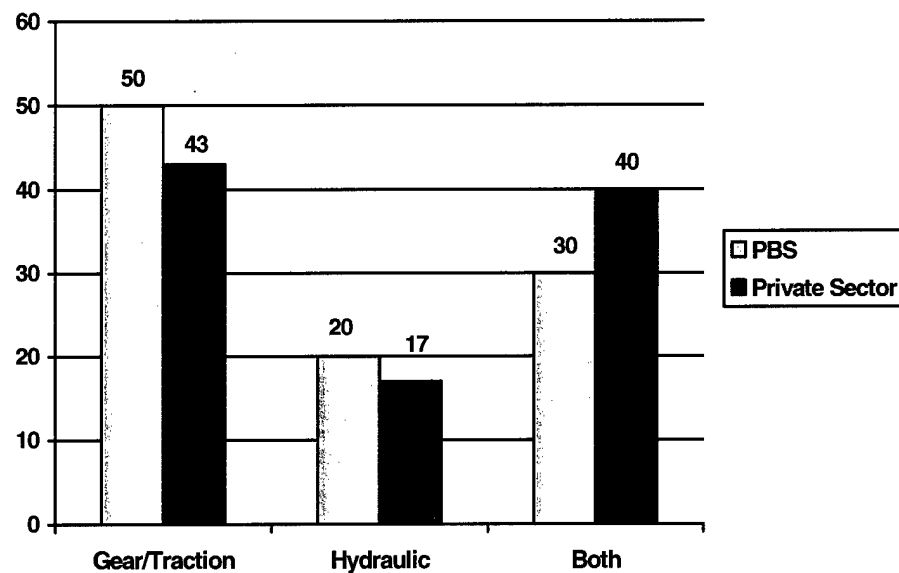
___ Hydraulic

___ Other (specify): ___

The following table illustrates survey responses for both PBS and private sector:

Organization	Number of Responses	Gear/Traction	Hydraulic	Both
PBS	30	15 (50%)	6 (20%)	9 (30%)
Private Sector	100	43 (43%)	17 (17%)	40 (40%)

Percentage of Responses by Elevator Type



	n
PBS	30
Private Sector	100

Based on the chart above we can conclude that:

- ◆ Both PBS and private sector primarily use gear/traction elevators.

QUESTION 33

Type of system(s) (check all that apply):

- ☐ Purchased steam
- ☐ Purchased cooled water
- ☐ Central chilled water plant with chillers, air handling units and cooling towers
- ☐ Central boilers
- ☐ Hot water baseboard radiation
- ☐ Electric duct heaters
- ☐ Rooftop units
- ☐ Water cooled floor by floor air handlers
- ☐ Water cooled heat pumps
- ☐ Through the wall air conditioning units
- ☐ Fan coil units
- ☐ Other (specify): _____

The following table summarizes survey responses for both PBS and private sector:

Organization	Steam	Cooled Water	Chilled Plant	Boiler	Radiation	Duct Heater	Rooftop Units	Air Handler	Heat Pump	A/C	Fan Coil
PBS	3 (8%)	3 (8%)	29 (73%)	25 (63%)	11 (28%)	3 (8%)	18 (45%)	20 (50%)	4 (10%)	6 (15%)	20 (50%)
Private Sector	4 (4%)	3 (3%)	72 (65%)	30 (27%)	11 (10%)	59 (54%)	45 (41%)	28 (25%)	20 (18%)	8 (7%)	34 (31%)

From the tables above we can examine the type of system variation between PBS and private sector:

- ◆ Most PBS and private sector buildings have central chilled water plant with chillers, air handling units and cooling towers.
- ◆ PBS and private sector use purchased steam, purchased cooled water, hot water baseboard radiation, water cooled heat pumps and through the wall air conditioning units infrequently (3% to 28% of buildings).
- ◆ Both PBS and private sector use rooftop units in about 40% of buildings.

- ◆ PBS rarely uses electric duct heaters while private sector uses it in about half of buildings.
- ◆ PBS uses central boilers, fan coil units and water cooled floor by floor air handlers in about half to two thirds of buildings while private sector uses these in a quarter to a third of buildings.

The following table illustrates "Yes" survey responses for PBS and private sector. We assume that blank responses are equivalent to "No":

PBS Survey ID	Total M/R \$/SF	Steam	Cooled Steam	Central Chilled Water	Central Boilers	Hot Water Radiation	Electric Duct Heaters	Rooftop Units	Water Cooled Air Handler	Water Cooled Heat Pumps	Through The Walls A/C	Fan Coil Units	Total
GA0125ZZ	0.34			X	X								2
GA0007ZZ	0.51			X	X				X			X	4
IL0209CF	0.56			X	X	X			X				4
TX0284DA	0.69			X	X								2
TX0058DA	0.70			X	X								2
GA0008ZZ	0.71			X	X				X				3
CA0150CC	0.72			X	X			X	X				4
CA9551RR	0.77			X	X								2
TX0292ZZ	0.78			X	X			X	X			X	5
GA0121ZZ	0.97			X								X	2
GA0087AD	0.97			X	X				X				3
TX0302ZZ	0.98			X	X			X	X			X	5
CA0185ZZ	1.01							X					1
MA0013ZZ	1.01	X		X		X		X				X	5
TX0057ZZ	1.02			X	X			X	X	X		X	6
MA0153ZZ	1.11			X	X		X		X			X	5
CA0283CC	1.18			X	X			X	X		X	X	6
CA0168ZZ	1.29			X	X			X	X			X	5
CA0224ZZ	1.32			X	X			X	X			X	5
MA0050ZZ	1.35			X	X	X			X	X		X	6
IL0303ZZ	1.36			X			X						2
IL0032ZZ	1.41			X	X				X			X	4
GA0501AA	1.41							X					1
IL0235FC	1.41		X			X			X		X	X	5
CA0191ZZ	1.46			X	X			X				X	4
MA0131ZZ	1.55	X		X		X	X	X	X	X	X	X	9
CA0149ZZ	1.57			X	X							X	3
CA0041ZZ	1.63			X	X			X				X	4
MA0011ZZ	1.65	X		X		X		X				X	5
IL0054ZZ	1.71			X	X	X		X	X			X	6
MA0135ZZ	1.75					X		X					2
CA0273ZZ	1.81			X	X				X	X			4
IL0231ZZ	1.84												

PBS Survey ID	Total M/R \$/SF	Steam	Cooled Steam	Central Chilled Water	Central Boilers	Hot Water Radiation	Electric Duct Heaters	Rooftop Units	Water Cooled Air Handler	Water Cooled Heat Pumps	Through The Walls A/C	Fan Coil Units	Total
ILO236FC	1.86		X			X			X		X	X	5
MA0138ZZ	2.12				X	X		X			X		4
MA0158ZZ	2.46			X		X							2
MA0076ZZ	2.72										X		1
IL0205ZZ	2.80		X		X				X				3
TX0200ZZ	6.59							X					1
IL0300ZZ	7.61												
Total		3(8%)	3(8%)	29(73%)	25(63%)	11(28%)	3(8%)	18(45%)	20(50%)	4(10%)	6(15%)	20(50%)	

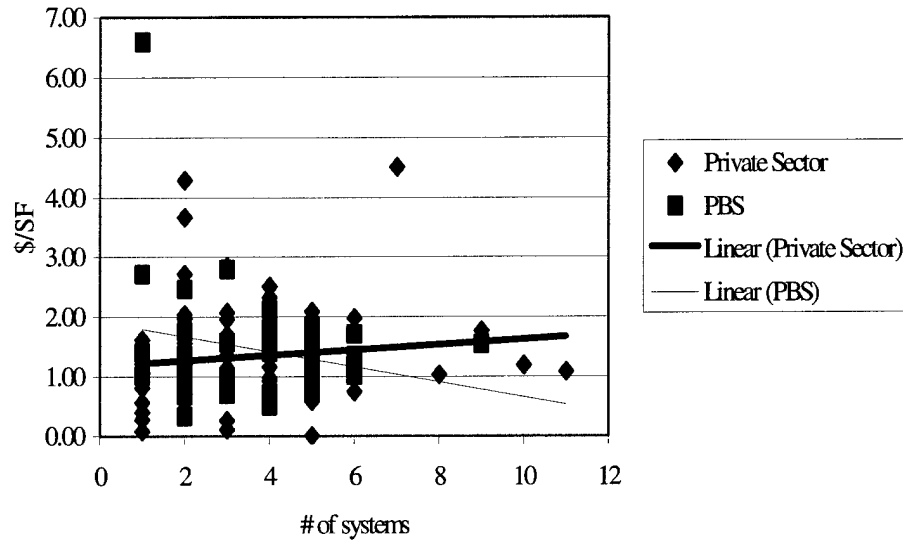
BOMA Survey ID	Total Maintenance \$/SF	Steam	Cooled Steam	Central Chilled Water	Central Boilers	Hot Water Radiation	Electric Duct Heaters	Rooftop Units	Water Cooled Floor	Water Cooled Heat Pumps	Through The Walls A/C	Fan Coil Units	Total
29118	0.00			x			x	x	x	x			5
29625	0.08							x					1
29424	0.11				x	x		x					3
29423	0.26				x	x		x					3
28024	0.28							x					1
17651	0.40							x					1
20596	0.46			x			x						2
29088	0.57									x			1
13505	0.59			x			x	x	x			x	5
28314	0.63			x			x	x	x			x	5
2373	0.71			x	x								2
40034	0.71			x	x								2
29109	0.73							x	x				2
13852	0.75			x			x	x	x	x		x	6
13298	0.76			x	x							x	3
8224	0.77						x		x			x	3
26183	0.81							x					1
5222	0.82			x									1
20266	0.83						x	x					2
40108	0.87				x			x					2
13670	0.90						x		x				2
28398	0.91				x	x				x			3
20300	0.92							x					1
17690	0.92											x	1
6034	0.93			x			x		x				3
10110	0.93			x			x			x		x	4
28315	0.94			x			x					x	3
28055	0.94				x	x		x					3
10517	0.96			x	x								2

BOMA Survey ID	Total Maintenance \$/SF	Steam	Cooled Steam	Central Chilled Water	Central Boilers	Hot Water Radiation	Electric Duct Heaters	Rooftop Units	Water Cooled Floor	Water Cooled Heat Pumps	Through The Walls A/C	Fan Coil Units	Total
28316	0.96			x			x						2
9320	0.96							x				x	2
813	0.97			x			x						2
26056	0.98			x			x		x			x	4
21068	0.99							x					1
29856	1.00			x			x		x	x		x	5
13050	1.02			x			x					x	3
29079	1.04			x	x		x	x	x	x	x	x	8
40204	1.04			x			x						2
21803	1.04			x			x	x	x			x	5
10047	1.06									x			1
28301	1.06						x	x					2
28302	1.07						x	x					2
13534	1.07						x	x					2
21703	1.07			x									1
28672	1.07			x			x	x					3
29847	1.08			x			x						2
12443	1.08			x			x	x					3
29473	1.09	x	x	x	x	x	x	x	x	x	x	x	11
40275	1.10						x	x		x			3
12839	1.12			x						x			2
19667	1.12			x									1
26436	1.14			x			x						2
26105	1.14			x			x						2
40361	1.15			x			x		x				3
29592	1.16			x			x	x	x				4
28049	1.17			x			x						2
40064	1.18	x								x			2
12840	1.19	x	x	x	x	x	x	x		x	x	x	10
40437	1.19			x			x	x	x			x	5
16423	1.20			x	x	x	x		x	x			6
28303	1.20						x	x					2
5221	1.21											x	1
25015	1.22			x			x						2
15818	1.22			x			x						2
14097	1.23			x	x								2
21900	1.25			x			x			x	x	x	5
8392	1.27										x		1
25458	1.29							x					1
27044	1.30				x			x					2
20035	1.32												

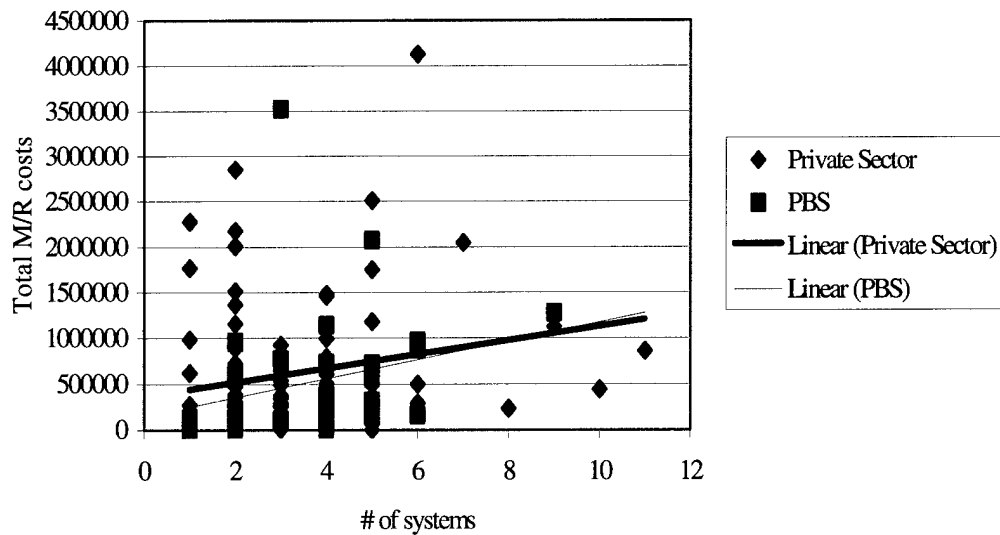
BOMA Survey ID	Total Maintenance \$/SF	Steam	Cooled Steam	Central Chilled Water	Central Boilers	Hot Water Radiation	Electric Duct Heaters	Rooftop Units	Water Cooled Floor	Water Cooled Heat Pumps	Through The Walls A/C	Fan Coil Units	Total
40145	1.34			x	x			x					3
27194	1.36			x	x			x		x		x	5
16334	1.36			x			x	x					3
40088	1.36			x			x	x					3
40065	1.39			x			x						2
18131	1.39			x			x		x			x	4
18464	1.41												
21677	1.42			x			x		x			x	4
20538	1.43			x			x						2
29808	1.50			x			x						2
40075	1.52				x								1
8590	1.52			x									1
28716	1.56						x	x					2
26156	1.61			x									1
17753	1.61			x									1
25382	1.64			x	x	x		x					4
5399	1.69			x			x					x	3
9317	1.70			x			x	x				x	4
18157	1.70						x		x	x			3
1412	1.77			x	x	x	x	x	x	x	x	x	9
10341	1.79			x	x								2
27128	1.88			x				x					2
3297	1.94			x	x				x			x	4
18811	1.96							x	x	x			3
27057	1.97			x	x								2
25048	1.97								x			x	2
1251	1.98			x	x								2
8277	1.98			x	x	x	x		x			x	6
13139	1.99			x			x	x			x		4
13030	2.05			x			x						2
2710	2.08			x			x					x	3
16271	2.09			x	x	x	x					x	5
8581	2.32	x	x						x			x	4
3895	2.51			x	x				x			x	4
28082	2.53			x								x	2
9517	2.71			x			x						2
272	2.84			x	x							x	3
27060	3.67			x	x								2
26157	4.29						x	x					2
12293	4.51			x	x		x	x	x	x	x		7
Total		4(4%)	3(3%)	72(65%)	30(27%)	11(10%)	59(54%)	45(41%)	28(25%)	20(18%)	8(7%)	34(31%)	

The following charts plots number of systems per building and the maintenance and repair costs on a unit basis and a total basis:

Number of Systems vs. Repair & Maintenance Costs



Number of Systems vs. Total Repair & Maintenance Cost



Both charts show that there is no strong relationship between maintenance and repair cost and the number of systems on a unit basis or a total basis.

QUESTION 34

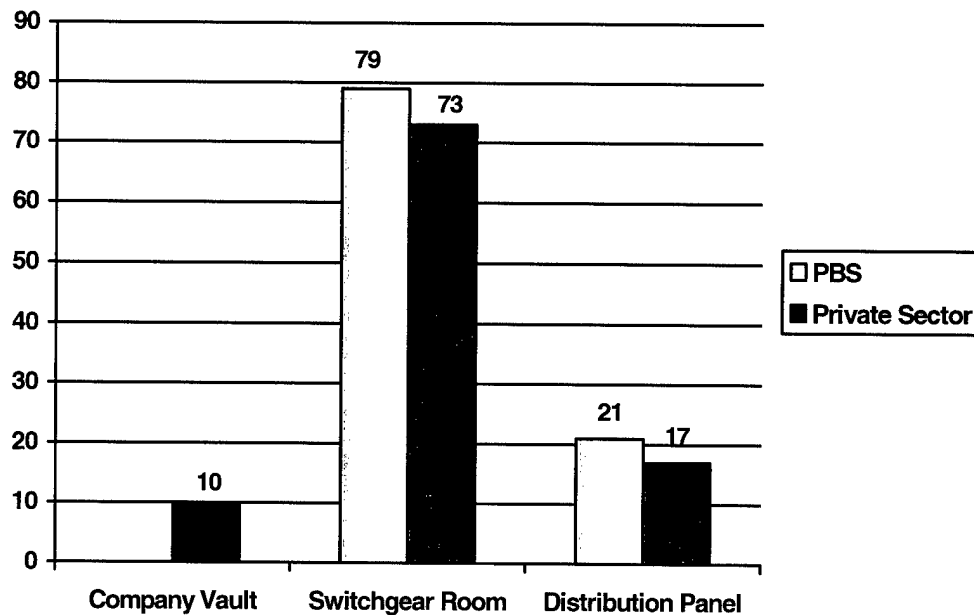
Indicate where maintenance and repair responsibilities begin (check one):

- ☐ Company vault
☐ Electrical switchgear room
☐ Distribution panel

The following chart illustrates survey responses for both PBS and private sector:

Organization	Number of Responses	Company Vault	Switchgear Room	Distribution Panel
PBS	38	0	30 (79%)	8 (21%)
Private Sector	100	10 (10%)	73 (73%)	17 (17%)

Percentage of Responses



	n
PBS	38
Private Sector	100

Based on the survey responses we can conclude that, for both PBS and private sector buildings maintenance and repair responsibilities begin at the electrical switchgear room.

QUESTION 35

What type of equipment is in the building (check all that apply):

- ☐ Smoke detectors
- ☐ Sprinklers
- ☐ Emergency lighting
- ☐ Fire alarms
- ☐ Exit signs
- ☐ Intercom
- ☐ Heat detectors
- ☐ CO monitors
- ☐ Visual alarms
- ☐ Other (specify): _____

The following table summarizes survey responses for both PBS and private sector:

Organization	Smoke Detectors	Sprinklers	Emergency Lighting	Fire Alarms	Exit Signs	Intercom	Heat Detectors	CO Monitors	Visual Alarms
PBS	36 (90%)	33 (83%)	38 (95%)	36 (90%)	39 (98%)	21 (53%)	24 (60%)	7 (18%)	28 (70%)
Private Sector	105 (95%)	97 (88%)	108 (98%)	104 (95%)	110 (100%)	72 (65%)	60 (55%)	28 (25%)	89 (81%)

From the tables above we can determine the type of equipment variation in the building between PBS and private sector:

- ◆ Both PBS and private sector have smoke detectors, sprinklers, emergency lighting, fire alarms and exit signs in almost the same percent of buildings.
- ◆ PBS has heat detectors in a larger percent of buildings than private sector.
- ◆ PBS has intercoms, CO monitors and visual alarms in a smaller percent of buildings than private sector.

The following tables show “Yes” responses for PBS and private sector. We assume that blank responses are equivalent to “No”:

PBS Survey ID	Smoke Detectors	Sprinklers	Emergency Lighting	Fire Alarms	Exit Signs	Intercom	Heat Detectors	CO Monitors	Visual Alarms	Other	Total
CA0150CC	x	x	x	x	x				x		
CA0168ZZ	x	x	x	x	x		x				6
CA0191ZZ	x	x	x	x	x	x	x		x		8
CA0224ZZ	x		x	x	x		x				5
CA0273ZZ	x	x	x	x	x	x			x		7
CA0283CC		x	x	x	x	x		x	x		
GA0007ZZ	x	x	x	x	x		x		x		7
GA0008ZZ	x	x		x	x		x				5
GA0087AD	x	x	x	x	x		x		x		7
GA0121ZZ	x	x	x	x	x	x	x		x		8
GA0125ZZ	x	x	x	x	x						5
GA0501AA	x	x	x	x	x				x		6
IL0054ZZ	x	x	x	x	x	x	x		x		8
IL0205ZZ	x	x	x	x	x	x	x		x		8
IL0209CF	x	x	x	x	x	x	x		x		8
IL0235FC	x	x	x	x	x	x	x	x	x		9
ILO236FC	x	x	x	x	x	x	x	x	x		9
MA0050ZZ	x	x	x	x	x	x	x		x		8
MA0131ZZ	x	x	x	x	x	x	x		x		8
MA0138ZZ	x	x	x	x	x		x	x	x		8
MA0153ZZ	x	x	x	x	x	x	x		x		8
CA0041ZZ	x	x	x	x	x	x	x		x		8
CA0149ZZ	x	x	x	x	x	x					6
CA0185ZZ			x	x	x						3
CA9551RR	x	x	x	x	x				x		6
MA0011ZZ	x	x	x	x	x	x	x	x	x		9
MA0013ZZ	x	x	x	x	x	x	x	x	x		9
MA0076ZZ	x		x		x						3
MA0135ZZ	x		x		x						3
MA0158ZZ			x	x	x		x		x		5
IL0032ZZ	x	x	x	x	x	x	x		x		8
IL0231ZZ	x	x	x	x	x						5
IL0300ZZ											
IL0303ZZ	x	x	x	x	x	x	x	x	x		9
TX0057ZZ	x	x	x	x	x				x		6
TX0058DA	x	x	x	x	x						5
TX0200ZZ	x		x		x						3
TX0284DA	x	x	x	x	x	x			x		7
TX0292ZZ	x	x	x	x	x	x	x		x		8
TX0302ZZ		x	x	x	x	x	x		x		8
Total	36(90%)	33(83%)	38(95%)	36(90%)	39(98%)	21(53%)	24(60%)	7(18%)	28(70%)		

BOMA Survey ID	Smoke Detectors	Sprinklers	Emergency Lighting	Fire Alarms	Exit Signs	Intercom	Heat Detectors	CO Monitors	Visual Alarms	Other	Total
10047					x						1
10110	x	x	x	x	x	x	x		x		8
10341	x	x	x	x	x	x	x		x		8
10517	x	x	x	x	x	x	x	x	x		9
12293	x	x	x	x	x	x	x		x		8
12443	x	x	x	x	x	x			x		7
1251	x	x	x	x	x	x		x			7
12839	x	x	x	x	x	x	x	x	x	x	10
12840	x	x	x	x	x		x		x		7
13030	x	x	x	x	x	x		x			7
13050	x	x	x	x	x	x	x		x		8
13139	x	x	x	x	x	x	x		x		8
13298	x	x	x	x	x	x	x		x		8
13505	x	x	x	x	x				x		6
13534	x	x	x	x	x	x	x				7
13670	x	x	x	x	x	x	x		x		8
13852	x	x	x	x	x	x			x		7
14097	x		x	x	x	x			x		6
1412	x	x	x	x	x	x	x	x	x	x	10
15818	x	x	x	x	x	x	x		x		8
16271	x	x	x	x	x	x	x		x		8
16334	x	x	x	x	x	x			x		7
16423	x	x	x	x	x	x			x		7
17651	x	x	x	x	x		x		x		7
17690	x	x	x	x	x	x			x	x	8
17753	x	x	x	x	x	x	x		x		8
18131	x	x	x	x	x	x	x		x		8
18157	x	x	x	x	x	x	x	x	x	x	10
18464	x		x	x	x	x	x		x		7
18811	x	x	x	x	x			x			6
19667	x	x	x	x	x	x					6
20035	x	x	x	x	x		x	x	x		8
20266	x	x	x	x	x	x	x		x		8
20300			x		x						2
20538	x	x	x	x	x	x	x		x		8
20596	x	x	x	x	x	x	x		x		8
21068			x		x					x	3
21677	x	x	x	x	x	x	x		x		8
21703	x	x	x	x	x	x					6
21803	x	x	x	x	x	x	x	x	x		9
21900	x	x	x	x	x	x	x	x	x		9

BOMA Survey ID	Smoke Detectors	Sprinklers	Emergency Lighting	Fire Alarms	Exit Signs	Intercom	Heat Detectors	CO Monitors	Visual Alarms	Other	Total
2373	x		x	x	x	x			x		6
25015	x	x	x	x	x	x			x		7
25048	x	x	x	x	x	x	x		x		8
25382	x	x	x	x	x	x	x		x		8
25458	x			x	x		x		x		5
26056	x	x	x	x	x	x			x		7
26105	x	x	x	x	x	x	x		x		8
26156	x	x	x		x		x				5
26157	x	x	x	x	x				x		6
26183	x		x	x	x		x	x			6
26436	x		x	x	x		x		x		6
27044	x	x	x	x	x				x		6
27057	x	x	x	x	x						5
27060	x	x	x	x	x	x		x	x		8
2710	x	x	x	x	x	x	x		x		8
27128	x	x	x	x	x		x	x	x		8
27194	x	x	x	x	x	x	x		x		8
272	x	x	x	x	x	x	x	x	x		9
28024	x	x	x	x	x				x		6
28049	x	x	x	x	x	x			x		7
28055		x	x	x	x		x		x		6
28082	x	x	x	x	x	x	x	x	x		9
28301	x	x	x	x	x				x		6
28302	x	x	x	x	x	x			x		7
28303	x	x	x	x	x				x		6
28314	x	x	x	x	x			x	x		7
28315	x	x	x	x	x				x		6
28316	x	x	x	x	x				x		6
28398	x	x	x	x	x		x	x	x		8
28672	x	x	x	x	x	x			x		7
28716	x		x	x	x				x		5
29079	x	x	x	x	x	x	x		x		8
29088	x	x	x	x	x						5
29109	x	x	x	x	x				x		6
29118	x	x	x	x	x	x	x	x	x		9
29423	x		x	x	x		x				5
29424			x		x						2
29473	x	x	x	x	x	x	x	x	x	x	10
29592	x	x	x	x	x	x	x	x	x	x	10
29625	x	x	x	x	x				x		6
29808	x	x	x		x	x	x		x		7
29847	x	x	x	x	x	x	x	x			8

BOMA Survey ID	Smoke Detectors	Sprinklers	Emergency Lighting	Fire Alarms	Exit Signs	Intercom	Heat Detectors	CO Monitors	Visual Alarms	Other	Total
29856	x	x	x	x	x	x	x		x		8
3297	x	x	x	x	x	x	x	x	x		9
3895	x	x	x	x	x						5
40034	x	x	x	x	x	x	x		x		8
40064	x	x	x	x	x	x	x	x			8
40065	x	x	x	x	x	x			x		7
40075	x	x	x	x	x				x		6
40088	x	x	x	x	x	x			x		7
40108	x	x	x	x	x				x		6
40145	x	x	x	x	x	x	x		x		8
40204	x	x	x	x	x	x	x				7
40275	x	x	x	x	x	x	x		x		8
40361	x	x	x	x	x		x		x		7
40437	x	x	x	x	x	x	x	x	x		9
5221	x	x	x	x	x	x			x	x	8
5222	x	x	x	x	x	x			x	x	8
5399	x	x	x	x	x	x	x		x		8
6034	x		x	x	x			x	x		6
813	x	x	x	x	x	x					6
8224	x	x	x	x	x	x	x	x	x		9
8277	x	x	x	x	x	x	x	x	x		9
8392	x	x	x	x	x				x		6
8581	x	x	x	x	x	x			x		7
8590	x	x	x	x	x				x		6
9317	x	x	x	x	x	x	x	x	x		9
9320	x	x	x	x	x						5
9517	x	x	x	x	x	x			x		7
Total	105(95%)	97(88%)	108(98%)	104(95%)	110(100%)	72(65%)	60(55%)	28(25%)	89(81%)	9(8%)	

QUESTION 36

Indicate if system has a PM program that is above the standard manufacturer's recommendation? If yes, please describe nature of program

System	Indicate if system receives above manufacturer's recommended PM	Describe
Elevators HVAC (chiller, air, handler, cooling tower, etc.) Electrical Structural Roof Fire/Life Safety Lighting Plumbing Other (specify):		

The following table summarizes survey responses for both PBS and private sector:

Organization	Elevators	HVAC	Electrical	Structural	Roof	Fire/Life Safety	Lighting	Plumbing
PBS	1(3%)	5(13%)	5(13%)		1(3%)	4(10%)	2(5%)	2(5%)
Private Sector	13(12%)	23(21%)	14(13%)	5(5%)	13(12%)	15(14%)	8(7%)	7(6%)

The table above shows that:

- ◆ PBS responses range between 3% and 13% while private sector is between 5% and 21%.
- ◆ Less PBS buildings systems receive a preventative maintenance program that is above the standard manufacturer's recommendation than private sector.

The following tables show "Yes" responses for both PBS and private sector:

PBS Survey ID	Elevators	HVAC	Electrical	Structural	Roof	Fire	Lighting	Plumbing	Other	Total
CA0150CC										
CA0168ZZ										
CA0191ZZ	x									1
CA0224ZZ										
CA0273ZZ		x	x		x	x	x			6
CA0283CC										

PBS Survey ID	Elevators	HVAC	Electrical	Structural	Roof	Fire	Lighting	Plumbing	Other	Total
GA0007ZZ										
GA0008ZZ										
GA0087AD										
GA0121ZZ										
GA0125ZZ										
GA0501AA										
IL0054ZZ						x				1
IL0205ZZ										
IL0209CF										
IL0235FC		x	x			x		x		4
IL0236FC		x	x			x		x		4
MA0050ZZ		x	x				x			3
MA0131ZZ										
MA0138ZZ										
MA0153ZZ										
CA0041ZZ		x								1
CA0149ZZ										
CA0185ZZ										
CA9551RR										
MA0011ZZ										
MA0013ZZ										
MA0076ZZ										
MA0135ZZ										
MA0158ZZ										
IL0032ZZ										
IL0231ZZ										
IL0300ZZ										
IL0303ZZ										
TX0057ZZ			x							1
TX0058DA										
TX0200ZZ										
TX0284DA										
TX0292ZZ										
TX0302ZZ										
Total	1(3%)	5(13%)	5(13%)		1(3%)	4(10%)	2(5%)	2(5%)		

BOMA Survey ID	Elevators	HVAC	Electrical	Structural	Roof	Fire	Lighting	Plumbing	Other	Total
10047										
10110										
10341										
10517										
12293										
12443										
1251	x	x								2
12839										
12840										
13030										
13050										
13139		x	x		x	x				4
13298	x	x	x	x	x	x	x	x	x	9
13505	x	x			x	x				4
13534										
13670										
13852			x							1
14097		x	x		x	x				4
1412										
15818	x	x	x				x	x		5
16271										
16334										
16423		x								1
17651										
17690										
17753										
18131		x								1
18157										
18464										
18811										
19667	x									1
20035										
20266	x	x	x	x	x	x	x	x	x	9
20300										
20538										
20596		x	x							2
21068										
21677		x								1
21703	x									
21803		x			x					2
21900										
2373		x	x		x	x				4
25015										
25048										

BOMA Survey ID	Elevators	HVAC	Electrical	Structural	Roof	Fire	Lighting	Plumbing	Other	Total
25382										
25458										
26056		x								1
26105	x	x	x				x	x		5
26156										
26157						x				1
26183										
26436		x				x	x			3
27044	x	x	x		x					4
27057										
27060										
2710										
27128										
27194										
272										
28024										
28049										
28055										
28082										
28301										
28302										
28303										
28314										
28315										
28316										
28398										
28672										
28716										
29079		x			x					2
29088										
29109										
29118	x	x	x	x	x	x	x	x		8
29423										
29424										
29473										
29592										
29625										
29808										
29847										
29856										
3297										
3895										
40034	x	x	x	x	x	x	x	x		8
40064										

BOMA Survey ID	Elevators	HVAC	Electrical	Structural	Roof	Fire	Lighting	Plumbing	Other	Total
40065										
40075						x				1
40088										
40108										
40145										
40204										
40275										
40361										
40437	x	x	x		x	x				5
5221										
5222										
5399										
6034										
813	x	x	x	x	x	x	x	x		8
8224										
8277										
8392		x								1
8581										
8590						x				1
9317										
9320										
9517						x				1
Total	13(12%)	23(21%)	14(13%)	5(5%)	13(12%)	15(14%)	8(7%)	7(6%)	2(2%)	

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