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FORT HOOD BUILDING OCCUPANT SURVEY

VOLUME 1 - TECHNICAL REPORT

DECEMBER 1993

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Science Applications International Corporation
An Employee-Owned Company

DoD EPA DOE SERDP
Strategic Environmental Research and Development Program
A Partnership to Improve the Environment

FORT HOOD BUILDING OCCUPANT SURVEY

VOLUME 1 - TECHNICAL REPORT

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Prepared for:

U.S. Army Construction Engineering Research Laboratory
Champaign, Illinois

under Contract No. DACA88-90-D-0033, RFQ DACA88-92-Q-0690

Prepared by:

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EXECUTIVE SUMMARY

Fort Hood is the FORSCOM installation participating in the Model Energy Installation Program (MEIP). The goal of this program is to reduce Fort Hood's energy use through energy saving strategies. A survey of ten administrative and five maintenance buildings was conducted at Fort Hood in Killeen, Texas in March 1993 to determine building occupant levels of satisfaction with and preferences related to the lighting, heating, cooling, ventilation, and humidity aspects of their work areas. The survey also contained questions to determine whether noise from various sources interfered with building occupant work activities and to assess the level of building occupant energy awareness. The survey was designed to provide insights into the work area characteristics preferred by building occupants, and to help in designing programs that reduce energy expenditures without the negative impacts on quality of life, productivity, and comfort that are sometimes associated with energy conservation programs. Following is a summary of key survey findings.

LIGHTING

Artificial and Natural Lighting Preferences. In most of the buildings surveyed, a majority of respondents liked either artificial or natural lighting in their work place.

Availability of Window Shading Devices. This question was asked to determine whether respondents with windows in their work area had shading devices they could use to reduce glare or to adjust the level of natural lighting. In most administrative buildings, a majority of respondents had blinds, or other window shading devices. In maintenance buildings, the presence of such devices was not common.

Supplementing Natural Light with Artificial Light. Respondents in both administrative and maintenance buildings supplement natural light with artificial light. Respondents indicated that they supplement natural light because it is not adequate or because they are more comfortable with additional artificial light. Respondents usually did not cite reduction in glare as a reason for supplementing natural light.

Number of Daily Hours Artificial Light Is Used. Respondents with windows in their work area do not use artificial lighting for fewer hours during the day than respondents without windows in their work area.

Availability and Use of Lighting Brightness Controls. The majority of respondents in administrative and maintenance buildings indicated they did not have the capability to control the brightness of artificial lighting with dimmers or other means of control (e.g., multiple light switches to enable control of subsets of ceiling fixtures or lamps within fixtures; task lighting).

Respondents with lighting controls indicated they usually do not use them. Based on anecdotal information from in-person interviews and on observation, two reasons can be suggested for the

infrequent use of lighting controls when they are available. First, respondents may set the lighting brightness at a level that gives satisfactory light and find that ambient lighting conditions in the work area do not change enough to warrant resetting the control. Second, a respondent's work area sometimes consisted of cubicles or an open floor plan containing several desks where lighting was provided by ceiling fixtures common to all in the work area. In such situations, it is more difficult to turn off some of the ceiling fixtures or lamps within ceiling fixtures without affecting other workers' lighting quality.

Reasons given for using controls tended to be because light was too bright or because there was not enough light. Glare was usually not mentioned as a reason for using lighting controls.

Type of Overhead or Fixed Artificial Lighting Source in Work Area and Satisfaction with the Lighting Quality. Most respondents in administrative buildings have fluorescent light as a primary lighting source. Most respondents, except for those in Building 108, are satisfied with the quality of lighting.

Fluorescent lighting is also the predominant lighting source in maintenance building work areas; however, many bay areas in maintenance buildings use high intensity discharge fixtures. Respondents in maintenance building work areas tend to give a lower satisfaction rating to work area lighting than their administrative building counterparts.

Use of Task Lighting. Respondents in Administrative Buildings 108, 4213, 4227, and 91012 were more likely to use task lighting, which is interesting because Buildings 108, 4213, and 4227 are older vintage. Many respondents in the maintenance work areas do not use task lighting. Higher percentages of respondents in Maintenance Buildings 88036, 40001, and 9553 used task lighting than in Buildings 32023 and 30009.

Attitudes toward Occupancy Sensors.

- Fewer respondents were "For" occupancy sensors in Office Workspaces than in the other areas for which respondents were asked to consider sensors. The percentage of respondents saying they were against occupancy sensors was relatively high in all buildings except Administrative Buildings 28000, 410, and 4213 and Maintenance Buildings 88036, 40001, and 32023.

- A high percentage of respondents were "For" occupancy sensors in:

    - Bathrooms in all buildings except Administrative Buildings 108 and 33010.

    - Conference Rooms in all buildings except Administrative Building 33010.

    - Recreation Areas in all buildings except Administrative Building 33010 and Maintenance Buildings 9553 and 30009.

- A high percentage of respondents in all buildings were "For" occupancy sensors in Break Areas.

HEATING/COOLING

Air Temperature

Primary Heating and Cooling Sources and Satisfaction with Work Area Temperature. Over 80% of respondents in administrative buildings have warm air from ventilation registers (central heating) as the primary heating source and central air as the primary cooling source. Heat for maintenance buildings came from several sources including central heating and radiant gas heaters (spot heating). Cooling in maintenance buildings tended to be limited to use of fans, often in combination with open bay doors.

In the summer, respondents in most buildings indicated that they were less satisfied with the temperature as the day progressed. In the winter, respondents in most buildings indicated that they were more satisfied with the temperature as the day progressed. A high percentage of respondents in Administrative Buildings 108 and 33010 were never or rarely satisfied with the work area temperature at any time during the day in the summer or winter. A high percentage of respondents in Maintenance Building 30009 were never or rarely satisfied with the temperature at any time during the day in the summer.

Capability to Regulate Work Area Temperature. Most respondents in administrative buildings are unable to regulate work area temperature. Respondents in maintenance buildings have the capability to regulate the winter heating temperature, but most of them do not make adjustments more than once a day. Maintenance building occupants usually had fans as a cooling source. Those who indicated they could regulate work area temperature may have been referring to changing the position or number of fans during the day to cool an area.

Impact of Sun on Work Area Comfort Level. In most administrative buildings, a majority of respondents with windows in the work area do not think that the sun has an impact on the work area temperature. Respondents with windows in maintenance areas, which are usually not served by central air conditioning, do tend to feel the sun has an impact on work area temperature.

Use of Supplementary Heating and Cooling Sources. A majority of respondents in both administrative and maintenance buildings do not use supplementary heating sources. Respondents in administrative buildings often indicated during the in-person interviews that they were not allowed to use such sources. For instance, in Administrative Building 1001, several respondents said they were told the building electrical system could not handle the extra load; in the past, such extra electric loads were blamed for computers going down. Some of these respondents indicated that they had used supplementary heating sources prior to being told they could not. Respondents in both administrative and maintenance buildings use supplementary cooling sources to regulate air temperature, with fans being mentioned as the primary source of supplementary

cooling. Open windows or a combination of fans and open windows were only mentioned by a significant percentage of respondents as a supplementary cooling source in six of the fifteen buildings surveyed. Of course, windows in the administrative buildings were not always designed to be opened.

Humidity

Satisfaction with Humidity Levels. In the summer, respondents from maintenance buildings, which lack central air conditioning, were less comfortable with humidity levels than respondents in administrative buildings. Administrative Building 39009 was the only administrative building where a high percentage of respondents indicated dissatisfaction with the humidity level in the summer. In the winter, maintenance building respondents tended to be more satisfied with humidity levels but were still not as satisfied as occupants of administrative buildings.

Capability to Regulate Humidity Level. In most buildings, administrative and maintenance, over 90% of the respondents can not regulate the humidity. Control capability may not be critical in administrative buildings, where most respondents in all buildings except Building 39009 were at least "Usually comfortable" with humidity. The effectiveness of summer humidity control strategies, including use of fans for cooling, could be explored for maintenance buildings.

Ventilation

In the following summary of responses, note that Administrative Buildings 1001 and 108 are mentioned most often as buildings with ventilation problems.

Respondents' Rating of Air Quality in the Work Area. Only in one administrative building (Building 23020) and in no maintenance buildings did more than 50% to respondents rate air quality in the "Excellent" range. Respondents in Administrative Buildings 1001 and 108 and Maintenance Buildings 40001, 9553, 88036, and 32023 were least satisfied with air quality. Administrative building respondents indicating that air quality was "Poor" cited reasons including: stuffiness, stale air, and lack of air circulation. Maintenance building respondents cited exhaust fumes from vehicle engines or other fume sources (solvents, paints, etc.).

Perceived Correlation between Air Quality and Health Problems. Administrative Buildings 4213, 108, 1001, and 33010 and Maintenance Buildings 40001 and 9553 had the highest percentages of respondents indicating that air quality contributed to health problems such as colds, headaches, and allergies. In Building 1001, respondents indicated that the ventilation system did not mix outside air with inside air; the same air, germs, and air pollutants were constantly recirculated.

Extent to which Respondents Felt Airborne and Settled Dust Were Problems in the Work Area. Airborne and settled dust tend to be a bigger problem in maintenance buildings than in

administrative buildings. A larger percentage of respondents, relative to other buildings, indicated a problem with airborne and settled dust in Administrative Buildings 1001 and 108 and in Maintenance Buildings 88036, 40001, 9553, and 30009.

Respondents' Rating of Air Circulation in the Work Area. Administrative Building 1001, 91012, 39009, 108, and 4227 and Maintenance Buildings 88036 and 40001 had the highest percentage of respondents indicating that air circulation was "Poor" or less than "Fair."

Capability to Control Air Quality in the Work Area and Importance of Being Able to Control Air Quality. In most buildings, a large percentage of respondents believe that the ability to control work area air quality is "Very important," but respondents are usually unable to control air quality, especially in administrative buildings.

NOISE

Extent to which Noise from Various Work Area Sources Interferes with Work Activities. In general, respondents did not indicate that HVAC noise and fluorescent lighting buzz were noise problems in their work area. The percentage of respondents indicating that "Other Work Area Noises" interfered with work activities to some extent tended to be higher for maintenance buildings than for administrative buildings. The only buildings where a high percentage of respondents indicated that "Other Work Area Noises" interfered with their work activities very much were Administrative Building 33010 (a training building where other noise sources were distracting in the classroom) and Maintenance Building 40001.

Actions Taken to Reduce Noise that Affects the Work Area. In administrative buildings, the main noise sources cited were office equipment or people talking. Strategies for dealing with noise emphasized telling people to talk more quietly or shutting an office door. In maintenance buildings, the main noise sources cited were vehicle engines, generators, power equipment, and exhaust fans. Occupants of these buildings usually deal with noise problems by wearing ear plugs or other hearing protection.

ENERGY AWARENESS

Knowledge of the Fort Hood Energy Awareness Program. In ten of the fifteen buildings surveyed, less than 75% of the respondents knew about the program. Only about 60% of all survey respondents were aware of the program, indicating opportunities for Energy Conservation Officers to increase program awareness.

Recognition of the Term "Peak Demand. Respondents in administrative buildings are more likely to have heard the term "peak demand" than are respondents in maintenance buildings. Of those who have heard the term "peak demand," respondents in administrative buildings are more likely to understand the meaning of the term than are respondents in maintenance buildings.

About 60% of all survey respondents had heard of the term "peak demand," and over 80% of them did indicate they understood the relationship between energy use during peak demand periods and Fort Hood's energy bills. Based on anecdotal information received during the in-person interviews, respondents seemed to know that energy used during peak periods was very expensive.

Awareness of Whether an Energy Conservation Officer (ECO) or Building Energy Monitor (BEM) Has Been Assigned to Respondent's Unit or Office. In all administrative and maintenance buildings surveyed, less than 50% of respondents know whether they have an ECO or BEM. ECOs and BEMs need to find opportunities to explain their role in the Fort Hood Energy Awareness Program to building occupants.

Awareness of Any Steps Taken to Save Energy in Respondent's Building. In most administrative buildings and in all maintenance buildings, less than 50% of survey respondents were aware of any steps taken to save energy in their building. Most of the respondents who were aware of steps taken either noticed no change in work area quality and comfort, or noticed a positive change.

Awareness of Whether Lights and Appliances Are Turned Off. In seven of the ten maintenance buildings surveyed and in three of the five maintenance buildings, most respondents indicated that lights and appliances were not always turned off when not in continuous use. In the seven administrative buildings, responses that lights were never or rarely turned off when not in continuous use ranged from 23% to 38% of respondents. In the three maintenance buildings, responses that lights were never or rarely turned off when not in continuous use ranged from 40% to 56%.

Incentives as a Motivator for Conserving Energy. Respondents in most buildings tended to be rather evenly divided in their opinions regarding whether energy saving incentive programs would cause them to change their current behavior or work patterns to save energy.

Suggestions for Saving Energy in Respondent's Building. Most of the suggestions related to lighting, in particular turning off lights when not in use. Other lighting suggestions included installation of occupancy sensors and rewiring of ceiling fixtures, accompanied by installation of more lighting switches, so that subsets of fixtures in a work area could be turned off when part of a work area was not occupied.

Meaning of the Term "Energy Conservation" to Respondent. Most respondents indicated that "energy conservation" meant "Saves you, and the Army, money." Few respondents singled out the negative "Too hot in the summer, too cold in the winter" to define the term, though many respondents did chose the definition "All of the preceding," which included the negative definition.

1. INTRODUCTION

1.1 Background

Fort Hood is the FORSCOM installation participating in the Model Energy Installation Program (MEIP). The goal of this program is to reduce Fort Hood's energy use through energy saving strategies. A survey of administrative and maintenance buildings was conducted at Fort Hood in Killeen, Texas in March 1993 to determine building occupant levels of satisfaction with and preferences related to the lighting, heating, cooling, ventilation, and humidity aspects of their work areas. The survey also contained questions to determine whether noise from various sources interfered with building occupant work activities and to assess the level of building occupant energy awareness. The survey was designed to provide insights into the work area characteristics preferred by building occupants, and to help in designing programs that reduce energy expenditures without the negative impacts on quality of life, productivity, and comfort often associated with energy conservation programs.

The following discussion of survey development and analysis represents an effort that covered ten administrative buildings and five maintenance buildings.

1.2 Survey Design

Literature Review

Introduction

A literature review was conducted to identify surveys upon which the Fort Hood Building Occupant Survey could be modeled. The review evaluated and summarized survey methodologies and provided guidance for developing survey strategy and methods.

The literature search addressed the following issues:

- locating similar surveys done in the past,
- determining whether the surveys matched the objectives desired for the Fort Hood occupant survey,
- defining specific questions from past surveys that could be used as models for questions for the Fort Hood Building Occupant Survey,
- defining effective methods for administering the survey, and
- defining effective methods for analyzing survey results.

The search for applicable survey materials covered publications lists and abstracts from various bibliography data bases, using different computer search systems, such as DIALOG , SilverPlatter 3.0 (Library of Congress), and the assistance system of the Edison Electric Institute Library. Databases involved in the search were:

- Energy, Science & Technology, 1974 to October 1992
- PASCAL, 1973 to October 1992
- NTIS, 1964-1992
- EI COMPENDEX PLUS, 1970-1992
- ENERGYLINE, 1970 to October 1992
- Federal Register, 4 January 1988 to 29 October 1992

Key words and phrases used for the search were energy conservation, survey, air quality, indoor condition, conservation program evaluation, and their different combinations. The first screening narrowed the range of potentially relevant publications from more than 100 to about 20. A review of abstracts for the 20 publications yielded ten sources with objectives comparable to those of the Fort Hood Building Occupant Survey. These sources are listed in Exhibit 1.1.

A review of the survey materials revealed the following:

1. None of the works examined fully covered all of the three building sectors of interest -- office, residential, and industrial facilities.

2. Some of the publications only investigated the indoor environment [Ref. 1,2,7,8,9], while others evaluated solely the problems of energy conservation [Ref. 2,10].

3. In some of the works, the methodology for evaluating responses was not clear.

Findings

Evaluating Office Environments [Ref 1] provided an example of questions where respondents were asked to respond on a scale. The range of the scale varied among questions, with scale ranges including seven, nine, or eleven response gradations.

The Handbook of Evaluation of Utility DSM Programs [Ref 3] provides examples of evaluation methodologies. The evaluations described in the handbook are targeted toward utilities' performance based on objective measurements, rather than scaled responses indicating a level of satisfaction or anecdotal information. Such evaluation methodologies were less applicable to the Fort Hood Building Occupant Survey, where anecdotal information gained during in-person interviews and building occupant preferences as indicated by answers to scaled questions was important. The handbook stresses the importance of (1) clearly identifying survey objectives and (2) designing the survey so that responses are in a form that can be evaluated relative to the survey objectives.

EXHIBIT 1.1: LIST OF REFERENCES FOR SURVEY DESIGN

1. Anderson and Weidemann, University of Illinois, Evaluating Office Environments, March 1992.

2. Heerwagen, J. et al. Energy Edge Post-Occupancy Evaluation Project, The Eastgate Corporate Center, University of Washington, Center for Planning and Design, Seattle, WA, June 1990.

3. Bronfman, B. et al. Handbook of Evaluation of Utility DSM Programs, Oak Ridge National Laboratory, ORNL/CON-336, Oak Ridge, Tennessee, December 1991.

4. Development of a Methodology to Evaluate the Bonneville Power Administration Institutional Buildings Program, JRB Associates, McLean, VA, July 1982.

5. Heidell, J.A. and K.M. Lorberau, Process Evaluation of BPA'S Energy Smart Design Assistance Program, Final Report, Synergic Resources Corporation, Seattle, WA, September 1989

6. Gavelis, W. Energy Smart Design Program Second Process Evaluation, Final Report, Synergic Resources Corporation, Seattle, WA, June 1991.

7. Energy Edge Post-Occupancy Evaluation Project: The Emerald People's Utility District Building, Eugene, Oregon, Final Report, Washington University, Center for Planning and Design. Seattle, WA. June 1990.

8. Energy Edge Post-Occupancy Evaluation Project: The Eugene Water and Electric Board Building, Eugene, Oregon, Final Report, Washington University, Center for Planning and Design. Seattle, WA. June 1990.

9. Energy Edge Post-Occupancy Evaluation Project: The Dubal/Beck Office Building, Portland, Oregon, Final Report, Washington University, Center for Planning and Design. Seattle, WA. June 1990.

10. From Comfort to Kilowatts: An Integrated Assessment of Electricity Conservation in Thailand's Commercial Sector, Volumes 1 & 2. Thesis (Ph.D). Lawrence Berkeley Lab., CA. August 1990.

Also, the proposed system of evaluation can be helpful in developing the methodology for response analysis for the survey.

Energy Edge Post-Occupancy Evaluation Project [Ref 2] includes many questions applicable to the Fort Hood Building Occupant Survey. The response ranking system is good because it reflects a wide spectrum of feelings expressed by the occupants. At the same time, the evaluation methodology yields precise evaluation of that wide spectrum. Graphical representation of the analysis clarifies the results. The survey does not cover energy conservation issues; it is directed toward the comfort conditions in offices, exclusively. Also, the questionnaire is not included in the report.

Examples of survey materials were used to:

- define ways of phrasing survey questions that would be appropriate for occupants of administrative and maintenance facilities, including questions to determine:
  - building occupant satisfaction with work area lighting, heating, cooling, ventilation, and humidity,
  - the extent to which HVAC, lighting or other noise sources interfered with work,
  - building occupant awareness of efforts to save energy,
  - building occupant awareness of Fort Hood's energy program, and
  - building occupant understanding of the term "energy conservation
- define appropriate response scales for each question (e.g., "Yes/No" or numerical scales).

Review of survey materials also led to the conclusion that separate surveys should be used for residential buildings and for administrative, maintenance, and warehouse buildings. The decision was made to focus on a survey of administrative, maintenance, and warehouse buildings.

Survey Design

Appendix A presents the Fort Hood Building Occupant Survey in a format that was used by interviewers to administer the survey in-person. Appendix B presents the Fort Hood Building Occupant Survey in the self-administered format. Both surveys contain the same questions; the in-person survey contains prompts to assist the interviewer in the survey process. In-person surveys were used to supplement the self-administered surveys to obtain anecdotal information and other details that would not be obtained from self-administered surveys alone.

The survey contains five sections:

1. General Questions - Covers information describing the work area, such as whether the work area was in an administrative or a maintenance building and whether windows were present in the work area.

2. Lighting - Determines building occupant preference for and satisfaction with work area lighting. Determines building occupant preferences for, use of, or access to technologies such as occupancy sensors, lighting dimmer controls, window shading devices, and task lighting to regulate light levels or save energy.

3. Heating/Cooling - This section includes questions covering air temperature, humidity, and ventilation. Determines building occupant satisfaction with the heating, cooling, and ventilation aspects of the work area. Determines the extent to which building occupants are able to and do use supplementary heating or cooling, ventilation, and humidity control technology to regulate work area conditions at comfortable levels.

4. Noise - Determines the extent to which building occupants feel various noise sources interfere with their work activities.

5. Energy Awareness - Determines the level of a respondent's awareness of energy saving activities at Fort Hood.

1.3 Survey Administration

The survey was given to a combination of administrative and maintenance personnel at Fort Hood. Buildings selected represented administrative and maintenance buildings of various sizes, vintages, and designs. The survey was administered using one of two methods -- self-administered or in-person interviews. The survey questions on both the self-administered and in-person survey forms were the same. The in-person survey allowed the surveyor to gather anecdotal information once the survey question had been asked and answered without prompting.

Total self-administered and in-person surveys allocated to each building were defined as a percentage of the total number of building occupants. In most of the buildings the target percentage of occupants surveyed was set at about 20%. Given the large number of occupants in Administrative Buildings 1001, 28000, and 410, the percent of occupants surveyed was set lower, at 10% to 13%. Self-administered surveys were distributed and in-person surveys were conducted such that the responses obtained were representative of:

- the different work areas in the building (different floors and different locations),
- occupants with windows and those without windows, and
- male and female building occupants.

A total of 470 self-administered survey forms was distributed; 362 forms were returned completed. Additionally, 100 surveys were administered in-person to Fort Hood personnel (out of a goal of 145 in-person surveys).[1] These results indicate an overall survey response rate of 75 percent. The total self-administered and in-person survey response rate for any given building surveyed was at least 50 percent.

Exhibit 1.2 indicates the division of survey responses among buildings. Responses were received from ten administrative buildings (367 surveys completed out of a 493 survey goal) and five maintenance buildings (81 surveys completed out of a 122 survey goal). Fourteen other surveys were returned for which the building number written on the survey by the respondent did not correspond to the building number assigned to the "point-of-contact" (POC) whose name had been typed on the survey prior to distribution. The responses contained in these surveys are only included in statistics covering all survey respondents, not in the building-specific analyses. The last column of Exhibit 1.2 indicates the total number of surveys returned for each building that were used for building-specific survey analyses.

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[1] The remaining 45 in-person surveys could not be completed because of personnel availability and scheduling constraints.

EXHIBIT 1.2: FORT HOOD BUILDING OCCUPANT SURVEY RESPONSE

Building Number	Building Function	Self-Administered		In-Person		Total
		Target	Actual	Target	Actual	Actual
28000	Admin.	72	45[1]	18	6	51
410	Admin.	60	30	15	8	38
4213	Admin.	10	8	5	4	12
4227	Admin.	7	6	5	4	10
39009	Admin.	22	18	8	9	27
23020	Admin.	14	14	6	6	20
1001	Admin.	130	116[2]	30	27	143
108 HSG	Admin.	11	9[3]	4	4	13
108 DOL	Admin.	11	0	4	0	0[4]
91012	Admin.	44	39	12	9	48
33010	Admin.	3	3	2	2	5
9553	Maint.	12	2[5]	5	0	2
30009[6]	Maint.	14	10	6	0	10
88036	Maint.	14	14	6	6	20
40001	Maint.	21	19	7	6	25
32023	Maint.	18	15[7]	7	9	24
32009	Maint.	7	0	5	0	0[8]
89010	Maint.	N/A	N/A	N/A	N/A	0[9]
Other[10]		0	14	0	0	14
		470	362	145	100	462

Notes:

[1] Excludes 2 self-administered surveys with Building 28000 POC name but marked with Building 29000 and 29008 numbers.

[2] Excludes 4 self-administered surveys with Building 1001 POC name but marked with Building 121, 4501, and 390042 numbers.

[3] Excludes 2 self-administered surveys with Building 108 HSG POC name but marked with Building 104 number.

[4] In-person and self-administered surveys not done; DOL section was moving.

[5] Excludes 1 self-administered survey with Building 9553 POC name but marked with Building 17001 number. Building 9553 personnel were unavailable for in-person interviews.

[6] The self-administered surveys returned were marked with the Building 30015 POC, but 10 were marked with the Building 30009 number and 2 with the Building 29022 number. The surveys marked with the Building 30009 number are used in the analysis. Building 30015 personnel were unavailable for in-person interviews.

[7] Excludes 3 self-administered surveys with Building 32023 POC name but marked with Building 34006 number.

[8] Building canceled prior to Ft. Hood visit

[9] Building canceled (secure building) and not included in survey target

[10] A POC's name was typed on each survey. One POC was assigned for each of the buildings surveyed. Fourteen surveys were returned with a building number that did not correspond to the building number assigned to the POC named on the survey. See Notes 1, 2, 3, 5, 6, and 7 for an accounting of the fourteen surveys. These surveys were included only in the "all buildings" analysis.

1.4 Database of Survey Responses

A database was developed that contains 462 surveys, each representing one respondent. Each survey is a separate record in the database. A disk containing the database in R-Base format accompanies this report; database filenames are listed in Exhibit C.1 in Appendix C. The analysis in Section 2.2 uses the database to search for responses to specific questions.

1.5 Analyses Conducted Using the Database

Also included on the disk accompanying this report, in WordPerfect 5.1 format, are files containing the results of various analyses conducted using the database. Exhibits C.2 through C.6 in Appendix C list the file names. Each building has one file that covers responses to all survey questions by all occupants who returned a survey (Exhibit C.2). Exhibits C.3 through C.5 list file names for runs that were done for each building to determine if responses for certain questions depended on whether or not an occupant had windows in the work area or whether a respondent was male or female. Exhibit 1.3 summarizes database analyses conducted to enable one to determine these correlations. Following is a list of the questions referenced in Exhibit 1.3.

Question Number	Lighting Section
2.	Are blinds, or other window shading devices, available to properly regulate the brightness of natural lighting?: This question should have been answered only by respondents with windows in their work area; however, other respondents also answered the question. Therefore, a run was made to ensure that only answers to the question by respondents with windows were considered.
3.	Do you supplement natural lighting with artificial lighting? If "Yes," why?: This question should have been answered only by respondents with windows in their work area; however, other respondents also answered the question. Therefore, a run was made to ensure that only answers to the question by respondents with windows were considered.
4.	How many hours during the day do you use artificial lighting in your work area?
9.	Are you satisfied with the quality of the artificial lighting in your work area?
10.	An automatic on-off lighting control (occupancy sensor) turns the lighting off when people are not in an area. What are your preferences regarding areas in your building where occupancy sensors would be useful?
11.	Do you supplement the overhead/fixed lighting with task lighting (e.g., a desk lamp or other light source that illuminates the immediate task on hand, rather than the entire work area)?

EXHIBIT 1.3: SCREENING SPECIFIC QUESTIONS FOR WINDOWS/NO WINDOWS AND MALE/FEMALE RESPONSES

SUMMARY OF DATABASE RUNS

		All Respondents		Male Respondents		Female Respondents		Male Respondents	Female Respondents
Questionnaire Section	Question Number	With Windows	Without Windows	With Windows	Without Windows	With Windows	Without Windows	Questions Independent of Windows	
Lighting	2	✓		✓		✓			
	3	✓		✓		✓			
	4	✓	✓						
	9	✓	✓	✓	✓	✓	✓		
	10							✓	✓
	11	✓	✓	✓	✓	✓	✓		
Heating/Cooling									
Air Temperature	3	✓	✓	✓	✓	✓	✓		
	5			✓		✓			
	6	✓	✓	✓	✓	✓	✓		
	7	✓	✓	✓	✓	✓	✓		
Humidity	1							✓	✓
Ventilation	1							✓	✓
	2							✓	✓
	5							✓	✓
	7							✓	✓
Noise	1							✓	✓

Question Number	Air Temperature Section
3.	How often are you satisfied with the temperature in your work area, during the summer and winter?
5.	Does the sun have any impact on the comfort level of your work area?
6.	Do you use a supplemental heating source to adjust the comfort level in your work area (e.g., space heater)?
7.	Do you use any supplemental cooling sources to adjust the comfort level in your work area (e.g., fans, windows, etc.)?

Question Number	Humidity Section
1.	How often do your feel comfortable with the humidity level in the summer and winter?

Question Number	Ventilation Section
1.	How would you describe the air quality in your work area?
2.	Do you think air quality has contributed in any way to the following health problems: colds, headaches, increased allergic reactions, other?
5.	How would you describe the air circulation in your work area?
7.	How important is it to you to be able to control the air quality in your work area?

Question Number	Noise Section
1.	To what extent does noise from "heating/ventilation/air conditioner," "fluorescent lighting buzz," and "other work area noise" sources in or around your work area interfere with your work activities?

2. OVERVIEW OF SURVEY FINDINGS

2.1 Demographics of the Survey Respondent Pool

Exhibit 2.1 indicates that the age distribution for both male and female survey respondents was similar and that the survey group was mostly under age 50. Respondent ages were distributed in roughly equal percentages over each ten-year age span (e.g., 18 to 29, 30 to 39, and 40 to 49).

EXHIBIT 2.1: AGE DISTRIBUTION OF RESPONDENTS

Age Bracket	Number of Surveys				Percent of Surveys		
	All	Male	Female	No Gender Listed	All	Male	Female
18-29	135	83	52		29	28	32
30-39	125	81	44		27	27	27
40-49	118	78	40		26	26	25
50-69	68	46	22		15	16	13
No age listed	16	9	5	2	3	3	3
Total Respondents	462	297	163	2	100	100	100

Exhibit 2.2 summarizes response to the survey in terms of gender. Exhibit 2.3 extends the male-female response summary to a building-specific basis.

Exhibit 2.4 summarizes the number of respondents with and without windows, by building.

EXHIBIT 2.2: GENDER DISTRIBUTION OF RESPONDENTS

	Number of Respondents	Percent of Respondent Pool
Male	297	65
Female	163	35
No gender listed	2	Negl.
Total Respondents	462	100

EXHIBIT 2.3: SURVEY RESPONDENTS BY GENDER

	Number of Respondents			
Building Number	Male	Female	No Response	Total
ADMINISTRATIVE BUILDINGS				
1001	71	72	0	143
28000	33	18	0	51
410	28	10	0	38
91012	25	23	0	48
39009	15	11	1	27
108	7	6	0	13
23020	17	3	0	20
4213	7	5	0	12
4227	9	1	0	10
33010	5	0	0	5
MAINTENANCE BUILDINGS				
88036	18	2	0	20
40001	23	2	0	25
32023	18	6	0	24
9553	2	0	0	2
30009	9	0	1	10
TOTALS				
Total Administration and Maintenance	287	159	2	448
Other Buildings Listed by Respondents but not on above list	10	4	0	14
Total Surveys	297	163	2	462

EXHIBIT 2.4: NUMBER OF SURVEY RESPONDENTS WITH AND WITHOUT WINDOWS IN THEIR WORK AREA

	Number of Respondents			
Building Number	Have window	Do not have window	**No response**	**Total**
ADMINISTRATIVE BUILDINGS				
1001	42	100	1	143
28000	26	24	1	51
410	20	18	0	38
91012	21	26	1	48
39009	17	10	0	27
108	2	11	0	13
23020	9	11	0	20
4213	4	8	0	12
4227	3	7	0	10
33010	1	4	0	5
Other[1]	0	8	0	8
MAINTENANCE BUILDINGS				
88036	2	18	0	20
40001	17	8	0	25
32023	6	16	2	24
9553	2	0	0	2
30009	4	6	0	10
Other[1]	0	6	0	6
TOTALS				
Total Surveys	181	276	5	462

[1] These surveys were included in the analysis of all respondents/all buildings, but were not included in building-specific analyses. These buildings are listed in the notes to Exhibit 1.2.

2.2 Analysis of Responses to Survey Questions and Conclusions/Recommendations Derived from the Analysis

Following is an analysis of survey responses to all questions in the Fort Hood Building Occupant Survey. The analysis covers the Lighting, Heating/Cooling, Noise, and Energy Awareness sections of the survey. A copy of the survey is included in Appendix B. Response data for the survey is included in Volume 2 of this report.

Several of the questions posed in the survey ask the building occupant to answer on a scale of 1 to 5. For example, the first question in the lighting section asks for building occupant preferences for artificial and natural lighting on a scale of 1 to 5. The questionnaire defines response level 1 as "Never Prefer," response level 3 as "Sometimes Prefer," and response level 5 as "Always Prefer." Response levels 2 and 4 lie between the defined levels. To facilitate data analysis, the following discussion often combines response levels 1 and 2 and response levels 4 and 5. The analysis always indicates when such a combination is being used. For example, discussion of results for the first lighting question combines response levels 4 and 5 under the label "Always Prefer." Thus, some respondents in this combined group stated the "Always Prefer" preference, while others answered with response level 4, between the lower preference response level 3 ("Sometimes Prefer") and the higher preference response level 5 ("Always Prefer").

Note: Exhibits follow the last question discussed for each of the four survey sections covered in the analysis.

LIGHTING

Question 1: Preferences for artificial and natural lighting when performing job/duties

Exhibit 2.5 indicates that in most of the buildings surveyed a majority of respondents liked artificial light and liked natural light when performing their job/duties. The following shows the variation in responses:

Strong preference for both artificial light and natural light (Difference between percentage of respondents who "Always Prefer" artificial light and those who "Always Prefer" natural light of less than 10 percentage points)

Administrative Buildings 1001 and 410
Maintenance Building 88036

Stronger preference for artificial light than for natural light (Percentage of respondents who "Always Prefer" artificial light at least 10 percentage points higher than percentage of those who "Always Prefer"

Administrative Buildings 28000, 23020, 4213, and 4227

Stronger preference for natural light than for artificial light (Percentage of respondents who "Always Prefer" natural light at least 10 percentage points higher than percentage of those who "Always Prefer" artificial light)

Administrative Buildings 91012, 39009, and 108
Maintenance Buildings 40001 and 32023

Did not prefer artificial light; strong preference for natural light

Administrative Building 33010 (In this building, four of the five respondents do not have windows in their work area. Exhibit 2.11 indicates that all respondents in this building are always satisfied with their lighting. Therefore, they may be wishing they had natural light.)

Strong preference for artificial light; did not prefer natural light

Maintenance Buildings 9553 and 30009 (Building 9553 had a very small sample [2 respondents]. Both Building 9553 respondents have windows in their work area, yet both have a negative preference for natural lighting. One respondent also had a strong negative preference for artificial lighting, possibly indicating dissatisfaction with lighting in the work area. Exhibit 2.11 does indicate that both respondents were "Never" satisfied with the lighting quality in their work area, which came from a combination of fluorescent, incandescent, and natural lighting.)

Conclusions/Recommendations

This question addressed artificial light and natural light independently, asking the respondent to state a preference for each source on a scale of "Never prefer" to "Always prefer." The respondents were not asked whether they preferred artificial light over natural light, or vice versa. A majority of respondents indicated they preferred artificial light and that they preferred natural light. One possible interpretation of this response is that during building renovations respondents would appreciate a combination of both lighting sources. For instance, new building designs might enable more workers to have some natural lighting (e.g., through skylights). Another possible interpretation is that either form of lighting could be provided without worrying about dissatisfaction.

The interesting responses to this question were from Buildings 39009, 4213, 33010, 40001, 9553, and 30009, where higher percentages of respondents seemed to "Never prefer" one of the light sources.

Question 2: Availability of blinds, or other window shading devices, to regulate the brightness of natural lighting

Exhibit 2.6 indicates that in all administrative buildings except for Building 23020 the majority and in many cases all respondents with windows in their work area have window shading devices. Such devices give them the capability to adjust the level of natural lighting or to reduce glare. In maintenance buildings, respondents in work areas with windows indicated that the presence of window shading devices was not common.

Question 3: Does respondent supplement natural light with artificial light?

Exhibit 2.7 indicates that respondents with windows in their work area supplement natural light with artificial light regardless of whether their work area is in an administrative or a maintenance building. The primary reason stated for supplementing natural light was that natural light was not adequate, followed by a feeling on the part of some respondents that they were more comfortable with additional artificial light. Respondents tended not to indicate that they supplemented natural light with artificial light to reduce glare.

Note: The percentage responses shown in Exhibit 2.7 for Building 108 represent only two respondents with windows in their work area.

Question 4: Number of hours during the day for using artificial light in the work area

Answers to Question 3 showed that respondents with windows do supplement natural light with artificial light; therefore, one might expect that respondents with windows would not necessarily indicate a lower number of hours of artificial light use than respondents without windows. Indeed, a comparison of the results shown in Exhibits 2.8A and 2.8B confirms that the presence of windows in a respondent's work area does not mean that he/she will use artificial lighting in the work area for fewer hours than would a respondent without windows in the work area.

Questions 5, 6, and 7: Capability to control brightness of artificial lighting; frequency of using lighting controls; and lighting conditions that cause respondent to use lighting control

This group of questions assesses the capability of the respondent to control the brightness of artificial lighting and asks respondents with means to control artificial lighting brightness how often they use the controls and what lighting conditions cause them to use the controls.

Exhibit 2.9 indicates that a majority of respondents in administrative buildings do not have the capability to control lighting brightness. Respondents indicating they could control lighting brightness tended not to have dimmer controls, which were mentioned only by some respondents in Administrative Buildings 1001, 91012, 23020, 4213, and 33010. Other methods of lighting control were listed more frequently. These included:

- Multiple light switches to control light fixtures in an area. This method of control was the most commonly mentioned of the non-dimmer strategies. Configurations included (1) one switch turning off one lamp in a three lamp fluorescent fixture, the other switch turning off two lamps in the fixture; and (2) multiple light switches to turn off fixtures in a section of the work area, rather than one light switch controlling all light fixtures in a work area.

- Desk lamps, or in maintenance areas extension lamps, to provide more light (a task lighting strategy)

- Window blinds to control amount of light

- Three-way lamps

Additionally, while conducting in-person surveys at Fort Hood, the survey team noticed instances in hallways where one switch controlled alternate fluorescent light fixtures.

Exhibit 2.9 also indicates that respondents in every maintenance building surveyed except Building 40001 indicated no capability to control lighting brightness. In Building 40001, two respondents indicated they controlled lighting by turning a task lighting bulb away from the face or by using an extension lamp (task lighting).

Respondents indicating they have lighting controls in their work area usually do not use them, as indicated by a high percentage of respondents in Buildings 1001, 28000, 410, 91012, 108, and 4213 giving "Never" responses in Exhibit 2.10. Such a result suggests that these respondents are generally satisfied with the lighting level. The exhibit also shows that those using lighting controls tended to do so either because light was too bright or there was not enough light. In such cases, one would probably set and leave the control at a level that provided an acceptable lighting level. Except for respondents from Building 4213, glare was not rated as highly as a reason for using lighting controls.

Conclusions/Recommendations

Many occupants with lighting control capability tend not to use it, indicating the demand for more controls may not be high. If lighting controls are being considered as an energy conservation measure, investigate implementation of automatic lighting controls that decrease the level of artificial light when more natural light is available. Such controls would not require the work area occupant to take an action to dim lighting.

Questions 8, 9, and 11: Type of overhead/fixed artificial light in respondents' work area; respondents' satisfaction with the quality of lighting in the work area; and respondents' use of task lighting to supplement overhead/fixed lighting

Administrative Buildings: Exhibit 2.11 shows that fluorescent lighting is the predominant lighting source and that a majority of respondents in most buildings say they are "Always" satisfied with the quality of lighting in their work area. The exception is Building 108, where respondents indicated the lowest percentage (46%) of high satisfaction responses and the highest percentage (31%) of low satisfaction responses.

Exhibit 2.13 shows that in several of the administrative buildings a majority of respondents do not supplement the overhead or fixed lighting in their work areas with task lighting. Respondents in Buildings 91012, 108, 4213, and 4227 were more likely to indicate use of task lighting, which is interesting because Buildings 108, 4213, and 4227 are older vintage.

Maintenance Buildings: Exhibit 2.11 indicates that fluorescent lighting is also the predominant lighting source in maintenance building work areas; however, several bay areas used high intensity discharge fixtures. Respondents in maintenance building work areas tend to give a lower satisfaction rating to work area lighting than their administrative building counterparts.

Exhibit 2.13 shows that in some of the maintenance buildings a majority of respondents do not supplement the overhead or fixed lighting in their work areas with task lighting. Respondents in Buildings 88036, 40001, and 9553 indicated they were more likely to use task lighting than respondents in Buildings 32023 and 30009.

Conclusions/Recommendations

Investigate why respondents in Administrative Building 108 had a relatively low satisfaction with overhead lighting and had such a high percentage using task lighting.

Question 10: Respondents' preferences regarding the usefulness of occupancy sensors in various areas of the building

Exhibits 2.12A through 2.12E consider respondent preferences for locating occupancy sensors. An initial look at the five tables shows that in most surveyed buildings, both administrative and maintenance, a majority of respondents was "For" occupancy sensors.

Respondents were more favorably disposed to occupancy sensors in bathrooms, conference rooms, recreation areas, and break areas than in office areas. Anecdotal information gained during the in-person interviews offers some insights regarding respondents' preferences for occupancy sensors. Some respondents observed that the configuration of many office areas is not suited to occupancy sensors. Many office areas have an open floor plan with ceiling fixtures

that light several cubicles or work areas. In work areas where offices had floor to ceiling walls and doors and in bathrooms, respondents wanted to be assured that (1) the light would not turn off while they were in the room and (2) they would not have to enter a dark room where someone might have hidden long enough so that the sensor turned the light off. Respondents in some buildings noted that their break area is adjacent to and open to a hall way. They wanted assurances that the sensor was designed so that in such areas, where people were constantly coming and going, the sensor would not constantly turn the lights on and off. This anecdotal information suggests that successful implementation of occupancy sensors will require (1) working with building occupants to understand usage patterns for a given area and concerns regarding use of occupancy sensors in an area and (2) designing occupancy sensor placement to address the concerns of the occupants.

Following is an analysis of the strength of the preference "For" or "Against" occupancy sensors in various buildings, which could be used as guidance in determining whether occupants could be expected to react favorably to occupancy sensors if installed in a given area. The analysis divides the response for each building area into three segments, spanning a range from strong to weaker preference for sensors.

Bathrooms

High percentage of respondents "For" occupancy sensors. The percentage of respondents "For" sensors was at least 50 percentage points higher than percentage of respondents "Against" sensors. Recommendation: Studies could be initiated in these buildings to determine where to add occupancy sensors.

Administrative Buildings 28000, 410, 39009, and 4213
Maintenance Buildings 88036, 32023, and 9553

High percentage of respondents "For" occupancy sensors/High percentage of respondents "Against" occupancy sensors. The percentage point spread between the "For" and "Against" percentages is no more than 5 percentage points. Recommendation: Educate respondents regarding the benefits of sensors; convince those against sensors that they can be used without inconveniencing the building occupant.

Administrative Building 108

High percentage of respondents "Against" occupancy sensors. The percentage of respondents "For" sensors is at least 50 percentage points lower than percentage of respondents "Against" sensors. Recommendation: Educate building occupants. Convince building occupants that sensor design and placement will be such that lights will not turn off if they are still in the room and will turn on the moment they start to enter the room.

Administrative Building 33010

Office Workspaces

High percentage of respondents "For" occupancy sensors/High percentage of respondents "Against" occupancy sensors. The percentage point spread between the "For" and "Against" percentages is no more than 5 percentage points. Recommendation: Educate respondents regarding the benefits of sensors; convince those against sensors that they can be used without inconveniencing the building occupant.

Administrative Building 91012
Maintenance Building 30009

High percentage of respondents "Against" occupancy sensors. The percentage of respondents "For" sensors is at least 50 percentage points lower than percentage of respondents "Against" sensors. Recommendation: Educate building occupants. Convince building occupants that sensor design and placement will be such that lights will not turn off if they are still in the room and will turn on the moment they start to enter the room.

Administrative Building 33010
Maintenance Building 9553

Conference Rooms

High percentage of respondents "For" occupancy sensors. The percentage of respondents "For" sensors was at least 50 percentage points higher than percentage of respondents "Against" sensors. Recommendation: Studies could be initiated in these buildings to determine where to add occupancy sensors.

Administrative Buildings 1001, 28000, 410, 91012, 39009, 4213, and 4227
Maintenance Buildings 88036, 32023, and 9553

High percentage of respondents "Against" occupancy sensors. The percentage of respondents "For" sensors is at least 50 percentage points lower than percentage of respondents "Against" sensors. Recommendation: Educate building occupants. Convince building occupants that sensor design and placement will be such that lights will not turn off if they are still in the room and will turn on the moment they start to enter the room.

Administrative Building 33010

Recreation Areas

High percentage of respondents "For" occupancy sensors. The percentage of respondents "For" sensors was at least 50 percentage points higher than percentage of respondents "Against" sensors. Recommendation: Studies could be initiated in these buildings to determine where to add occupancy sensors.

Administrative Buildings 1001, 28000, 410, 91012, 39009, 108, and 4213
Maintenance Building 88036

High percentage of respondents "For" occupancy sensors/High percentage of respondents "Against" occupancy sensors. The percentage point spread between the "For" and "Against" percentages is no more than 5 percentage points. Recommendation: Educate respondents regarding the benefits of sensors; convince those against sensors that they can be used without inconveniencing the building occupant.

Maintenance Building: 9553

Break Areas

High percentage of respondents "For" occupancy sensors. The percentage of respondents "For" sensors was at least 50 percentage points higher than percentage of respondents "Against" sensors. Recommendation: Studies could be initiated in these buildings to determine where to add occupancy sensors.

Administrative Buildings 1001, 28000, 410, 91012, 39009, 108, and 4213
Maintenance Buildings 88036 and 9553

High percentage of respondents "For" occupancy sensors/High percentage of respondents "Against" occupancy sensors. The percentage point spread between the "For" and "Against" percentages is no more than 5 percentage points. Recommendation: Educate respondents regarding the benefits of sensors; convince those against sensors that they can be used without inconveniencing the building occupant.

Maintenance Building 40001

EXHIBIT 2.5: RESPONDENT LIGHTING PREFERENCES

(Section 2: Lighting - Question 1)

	Artificial Light				Natural Light			
	Never Prefer (1 or 2)	Sometimes Prefer (3)	Always Prefer (4 or 5)	**No Response**	Never Prefer (1 or 2)	Sometimes Prefer (3)	Always Prefer (4 or 5)	**No Response**
Building Number	Percent of Total Answering Question			Percent of Total Respondents	Percent of Total Answering Question			Percent of Total Respondents
ADMINISTRATIVE BUILDINGS								
1001	17	31	53	20	19	27	55	24
28000	7	37	57	10	19	38	43	27
410	9	29	62	12	13	34	53	16
91012	15	39	46	15	5	28	67	19
39009	22	37	41	0	25	21	54	11
108	11	33	56	31	0	18	82	15
23020	15	35	50	0	11	58	32	5
4213	8	25	67	0	25	38	38	33
4227	10	40	50	0	11	56	33	10
33010	40	40	20	0	20	0	80	0
MAINTENANCE BUILDINGS								
88036	15	40	45	0	17	33	50	10
40001	29	33	38	16	11	21	68	32
32023	23	45	32	8	6	39	56	25
9553	50	0	50	0	100	0	0	0
30009	29	14	57	30	38	38	25	20

EXHIBIT 2.6: AVAILABILITY OF WINDOW SHADING DEVICE - RESPONDENTS WITH WINDOWS

(Section 2: Lighting - Question 2)

	Window Shading Device Available	Window Shading Device Not Available	**No Response**
Building Number	Percent of Total Answering Question		Percent of Total Respondents
ADMINISTRATIVE BUILDINGS			
1001	98	2	7
28000	100	0	15
410	94	6	10
91012	100	0	0
39009	100	0	6
108	100	0	0
23020	37	63	11
4213	100	0	0
4227	100	0	0
33010	100	0	0
MAINTENANCE BUILDINGS			
88036	0	100	50
40001	22	78	18
32023	0	100	0
9553	50	50	0
30009	0	100	0

EXHIBIT 2.7: RESPONDENTS SUPPLEMENT NATURAL LIGHT WITH ARTIFICIAL LIGHT - RESPONDENTS WITH WINDOWS

(Section 2: Lighting - Question 3)

Building Number	Supplement Natural Light	Do Not Supplement Natural Light	No Response	Reason for Supplementing Natural Light			
	Percent of Total Answering Question		Percent of Total Respondents	Natural Light Not Adequate	Reduced Glare on Computer	Feel More Comfortable with Additional Artificial Light	Other
				Percent of All Responses by Those Supplementing Natural Light			
ADMINISTRATIVE BUILDINGS							
1001	82	18	7	52	19	22	7
28000	100	0	12	62	11	27	0
410	83	17	10	42	16	32	10
91012	95	5	0	74	13	13	0
39009	87	13	6	47	18	18	17
108	50	50	0	100	0	0	0
23020	100	0	11	75	0	25	0
4213	75	25	0	25	0	50	25
4227	100	0	0	33	33	33	0
33010	100	0	0	0	0	100	0
MAINTENANCE BUILDINGS							
88036	100	0	0	50	0	50	0
40001	100	0	12	71	12	6	11
32023	100	0	0	50	0	0	50
9553	100	0	0	33	33	0	33
30009	100	0	0	50	0	50	0

EXHIBIT 2.8A: NUMBER OF HOURS RESPONDENTS WITH WINDOWS USE ARTIFICIAL LIGHT

(Section 2: Lighting - Question 4)

Building Number	Total Respondents with Windows	Weekdays			Weekends		
		Morning	Afternoon	Evening	Morning	Afternoon	Evening
		Weighted Average Hours (No. of Respondents)			Weighted Average Hours (No. of Respondents)		
ADMINISTRATIVE BUILDINGS							
1001	42	4.38 (40)	4.33 (41)	2.50 (8)	2.80 (5)	4.00 (2)	4.00 (2)
28000	26	4.24 (23)	4.09 (23)	2.87 (15)	3.00 (5)	2.67 (3)	4.00 (1)
410	20	4.16 (19)	4.69 (18)	2.69 (13)	3.25 (8)	4.00 (5)	4.33 (3)
91012	21	4.17 (21)	4.33 (21)	3.25 (8)	3.25 (4)	3.33 (3)	3.00 (2)
39009	17	4.19 (16)	4.50 (16)	2.00 (9)	3.60 (5)	3.60 (5)	2.00 (2)
108	2	4.00 (2)	4.00 (2)	4.00 (2)	4.00 (2)	4.00 (2)	4.00 (2)
23020	9	3.78 (9)	4.19 (8)	3.00 (3)	3.50 (4)	6.00 (1)	6.00 (1)
4213	4	4.00 (4)	4.00 (4)	2.00 (1)	4.00 (1)	4.00 (1)	2.00 (1)
4227	3	4.00 (3)	4.00 (3)	2.00 (1)	No response		
33010	1	4.50 (1)	3.50 (1)	No response	No response		
MAINTENANCE BUILDINGS							
88036	2	4.00 (2)	4.00 (2)	No response	No response		
40001	17	4.03 (16)	3.83 (15)	1.70 (5)	4.00 (1)	4.00 (1)	No response
32023	6	4.17 (6)	4.42 (6)	1.00 (1)	No response		
9553	2	5.50 (2)	6.00 (2)	8.00 (1)	0 (1)	0 (1)	0 (1)
30009	4	3.00 (4)	4.75 (4)	3.00 (1)	No response		

EXHIBIT 2.8B: NUMBER OF HOURS RESPONDENTS WITHOUT WINDOWS USE ARTIFICIAL LIGHT

(Section 2: Lighting - Question 4)

Building Number	Total Respondents without Windows	Weekdays			Weekends		
		Morning	Afternoon	Evening	Morning	Afternoon	Evening
		Weighted Average Hours (No. of Respondents)			Weighted Average Hours (No. of Respondents)		
ADMINISTRATIVE BUILDINGS							
1001	100	4.38 (96)	4.45 (94)	3.16 (25)	3.73 (11)	3.55 (10)	3.00 (4)
28000	24	4.29 (24)	4.63 (24)	2.78 (9)	2.20 (5)	2.67 (3)	5.00 (1)
410	18	4.19 (18)	4.36 (18)	2.00 (6)	3.33 (3)	3.33 (3)	1.00 (1)
91012	26	4.18 (25)	4.29 (24)	1.33 (3)	4.50 (2)	4.00 (4)	No response
39009	10	4.17 (9)	4.44 (9)	2.20 (5)	3.00 (2)	3.00 (2)	1.50 (2)
108	11	3.80 (10)	3.80 (10)	1.67 (3)	4.50 (2)	4.00 (2)	No response
23020	11	4.83 (9)	4.78 (9)	4.50 (4)	4.21 (7)	4.57 (7)	5.75 (4)
4213	8	4.31 (8)	4.13 (8)	2.00 (1)	4.50 (2)	3.00 (2)	No response
4227	7	4.14 (7)	4.00 (7)	No response	No response		4.00 (1)
33010	4	3.38 (4)	4.00 (4)	3.00 (1)	4.00 (2)	5.00 (2)	3.00 (1)
MAINTENANCE BUILDINGS							
88036	18	4.15 (17)	4.00 (17)	No response	No response		
40001	8	3.63 (8)	3.63 (8)	No response	No response		
32023	16	4.37 (15)	4.33 (15)	3.50 (4)	8.00 (1)	8.00 (1)	8.00 (2)
9553	0	No response			No response		
30009	6	3.80 (5)	4.00 (4)	3.33 (3)	4.00 (1)	4.00 (1)	3.00 (2)

EXHIBIT 2.9: RESPONDENT ABILITY TO CONTROL BRIGHTNESS OF ARTIFICIAL LIGHT
(Section 2: Lighting - Question 5)

					Method of Controlling Brightness		
		Can Control Lighting Brightness			Dimmer Control	Other	**No Response**
		Yes	No	**No Response**	Only Respondents Able to Control Brightness		
Building Number	**Total Number of Respondents**	Percent of Total Answering Question		Percent of Total Respondents	Percent of Total Answering Question		Percent of Total Respondents Able to Control Brightness
ADMINISTRATIVE BUILDINGS							
1001	143	26	74	0	59	41	0
28000	51	22	78	0	0	100	0
410	38	13	87	0	0	100	20
91012	48	21	79	0	10	90	0
39009	27	4	96	0	0	100	0
108	13	23	77	0	0	100	0
23020	20	5	95	0	100	0	0
4213	12	33	67	0	25	75	0
4227	10	10	90	0	0	100	0
33010	5	20	80	0	100	0	0
MAINTENANCE BUILDINGS							
88036	20	0	100	0	N/A	N/A	N/A
40001	25	8	92	0	0	100	0
32023	24	0	100	0	N/A	N/A	N/A
9553	2	0	100	0	N/A	N/A	N/A
30009	10	0	100	0	N/A	N/A	N/A

EXHIBIT 2.10: RESPONDENT USE OF LIGHTING CONTROL - ONLY RESPONDENTS STATING IN QUESTION 5 THAT THEY CAN CONTROL LIGHT BRIGHTNESS

(Section 2: Lighting - Questions 6 and 7)

	Frequency of Using Lighting Control				Reason for Using Lighting Control					
	Never (1 or 2)	Sometimes (3)	Often (4 or 5)	No Response	Light too bright	Not enough light	Glare	Light uneven/Shadows	Other	No need for lighting control
Building Number	Percent of Total Answering Question			Percent of Total Able to Control Light Brightness	Percent of Total Responses					
ADMINISTRATIVE BUILDINGS										
1001	64	11	25	3	17	32	17	6	6	23
28000	64	18	18	0	21	36	0	7	7	29
410	40	20	40	0	43	29	14	0	14	0
91012	70	10	20	0	31	8	15	0	15	31
39009	0	0	100	0	0	0	0	0	100	0
108	50	50	0	33	33	33	33	0	0	0
23020	0	0	100	0	0	100	0	0	0	0
4213	50	0	50	0	17	33	50	0	0	0
4227	0	100	0	0	0	0	0	0	100	0
33010	0	100	0	0	100	0	0	0	0	0
MAINTENANCE BUILDINGS										
88036	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
40001	0	0	100	0	20	20	0	20	40	0
32023	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
9553	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
30009	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

EXHIBIT 2.11: RESPONDENT SATISFACTION WITH LIGHTING QUALITY
(Section 2: Lighting - Questions 8 and 9)

	Type of Overhead/Fixed Artificial Light in Work Area					Satisfaction with Lighting Quality			
	Fluorescent	Incandescent	Other	Don't Know	**No Response**	Never (1 or 2)	Sometimes (3)	Always (4 or 5)	**No Response**
Building Number	Percent of Total Answering Question				Percent of Total Respondents	Percent of Total Answering Question			Percent of Total Respondents
ADMINISTRATIVE BUILDINGS									
1001	87	4	0	8	1	8	19	73	0
28000	76	8	0	16	4	2	20	78	2
410	97	0	0	3	5	0	21	79	0
91012	96	0	0	4	2	11	23	66	2
39009	93	0	0	7	0	7	41	52	0
108	100	0	0	0	0	31	23	46	0
23020	95	0	0	5	5	5	20	75	0
4213	92	0	0	8	0	8	25	67	0
4227	100	0	0	0	0	20	0	80	0
33010	100	0	0	0	0	0	0	100	0
MAINTENANCE BUILDINGS									
88036	42	11	37	11	5	5	40	55	0
40001	61	4	17	17	8	32	44	24	0
32023	83	17	0	0	0	25	29	46	0
9553	50	50	0	0	0	100	0	0	0
30009	90	0	0	10	0	0	30	70	0

EXHIBIT 2.12B: RESPONDENT PREFERENCES FOR OCCUPANCY SENSORS - OFFICE WORKSPACES

(Section 2: Lighting - Question 10)

	Against (1 or 2)	Neutral (3)	For (4 or 5)	**Not Applicable**	**No Response**
Building Number	Percent of Total Answering Question, excluding answers of "Not Applicable"			Percent of Total Respondents	
ADMINISTRATIVE BUILDINGS					
1001	36	18	46	18	0
28000	19	31	50	18	0
410	14	33	53	5	0
91012	35	26	40	10	0
39009	33	8	58	11	0
108	42	33	25	8	0
23020	40	35	25	0	0
4213	20	30	50	17	0
4227	56	22	22	10	0
33010	75	0	25	20	0
MAINTENANCE BUILDINGS					
88036	25	25	50	20	0
40001	20	33	47	40	0
32023	13	43	43	4	0
9553	100	0	0	0	0
30009	50	0	50	20	0

EXHIBIT 2.12C: RESPONDENT PREFERENCES FOR OCCUPANCY SENSORS - CONFERENCE ROOMS

(Section 2: Lighting - Question 10)

	Against (1 or 2)	Neutral (3)	For (4 or 5)	**Not Applicable**	**No Response**
Building Number	Percent of Total Answering Question, excluding answers of "Not Applicable"			Percent of Total Respondents	
ADMINISTRATIVE BUILDINGS					
1001	17	12	72	15	0
28000	5	16	80	14	0
410	8	17	75	5	0
91012	16	14	70	10	0
39009	9	4	87	15	0
108	8	42	50	8	0
23020	20	25	55	0	0
4213	10	10	80	17	0
4227	0	11	89	10	0
33010	75	0	25	20	0
MAINTENANCE BUILDINGS					
88036	6	24	71	15	0
40001	14	36	50	44	0
32023	5	40	55	17	0
9553	0	0	100	0	0
30009	29	14	57	30	0

EXHIBIT 2.12D: RESPONDENT PREFERENCES FOR OCCUPANCY SENSORS - RECREATION AREAS

(Section 2: Lighting - Question 10)

	Against (1 or 2)	Neutral (3)	For (4 or 5)	**Not Applicable**	**No Response**
Building Number	Percent of Total Answering Question, excluding answers of "Not Applicable"			Percent of Total Respondents	
ADMINISTRATIVE BUILDINGS					
1001	14	18	68	28	0
28000	0	23	77	31	0
410	8	15	77	32	0
91012	13	16	72	33	0
39009	10	0	90	26	0
108	0	44	56	31	0
23020	25	31	44	20	0
4213	11	0	89	25	0
4227	29	14	57	30	0
33010	50	25	25	20	0
MAINTENANCE BUILDINGS					
88036	8	33	58	40	0
40001	9	36	55	56	0
32023	18	24	59	29	0
9553	50	0	50	0	0
30009	57	0	43	30	0

EXHIBIT 2.12E: RESPONDENT PREFERENCES FOR OCCUPANCY SENSORS - BREAK AREAS

(Section 2: Lighting - Question 10)

	Against (1 or 2)	Neutral (3)	For (4 or 5)	**Not Applicable**	**No Response**
Building Number	Percent of Total Answering Question, excluding answers of "Not Applicable"			Percent of Total Respondents	
ADMINISTRATIVE BUILDINGS					
1001	16	12	72	18	0
28000	3	26	71	33	0
410	7	21	71	26	0
91012	10	13	78	17	0
39009	0	0	100	15	0
108	8	33	58	8	0
23020	22	33	44	10	0
4213	18	0	82	8	0
4227	20	20	60	0	0
33010	25	25	50	20	0
MAINTENANCE BUILDINGS					
88036	6	28	67	10	0
40001	32	32	37	24	0
32023	11	33	56	25	0
9553	0	0	100	0	0
30009	29	14	57	30	0

EXHIBIT 2.13: RESPONDENTS SUPPLEMENT OVERHEAD LIGHTING WITH TASK LIGHTING

(Section 2: Lighting - Question 11)

	Supplement Overhead or Fixed Lighting with Task Lighting	Do Not Supplement Overhead or Fixed Lighting with Task Lighting	No Response
Building Number	Percent of Total Answering Question		Percent of Total Respondents
ADMINISTRATIVE BUILDINGS			
1001	31	69	1
28000	13	87	6
410	18	82	0
91012	49	51	2
39009	11	89	0
108	69	31	0
23020	10	90	0
4213	58	42	0
4227	60	40	0
33010	20	80	0
MAINTENANCE BUILDINGS			
88036	58	42	5
40001	80	20	0
32023	30	70	4
9553	50	50	0
30009	10	90	0

HEATING/COOLING

Air Temperature

Questions 1, 2, and 3: Respondents' primary heating and cooling source and respondents' satisfaction with air temperature in the work area

Exhibit 2.14 indicates that over 80% of respondents in the administrative buildings have warm air from ventilation registers (central heating) as the primary heating source and central air as the primary cooling source. The responses regarding primary heating and cooling sources were more varied for maintenance buildings. The primary heating source for maintenance buildings is either warm air with ventilation registers (central heating) or spot heating from radiant gas heaters. Radiant gas heaters are mounted on the walls of maintenance bay work areas. The primary cooling source for maintenance buildings is use of fans, especially in combination with opened bay doors.

Satisfaction with Air Temperature - Summer

One would expect the work area air temperature to be coolest in the morning. As the outside temperature increased during the day, the work area temperature might increase depending on the rate of heat gain through the building envelope, the rate of cooling, and the location of thermostats. In the evening, when the cooling system is shut down for the night, responses in Exhibit 2.15A indicates that the percentage of those "Never" satisfied often falls relative to the afternoon responses, resulting in a higher percentage of respondents satisfied with the air temperature. Several factors can contribute to such a response: (1) fewer people work at night, reducing the response sample size; those working in the evening may be used to the temperature; (2) fewer people in the work area, so heat gain from body heat diminishes; (3) reduced heat gain from work area equipment because it may not be operating at daytime levels; (4) reduced rate of building envelope heat gain, or increase in the rate of building envelope heat loss, as evening temperatures fall.

Exhibit 2.15A shows that in most cases building occupant satisfaction with the air temperature does track the change in air temperature, being highest at cooler morning temperatures and lowest during the midday and afternoon periods. The following, derived from Exhibit 2.15A, divides the buildings surveyed into four categories of respondent satisfaction with work area air temperature. The results can be used to determine administrative buildings that may have cooling system performance problems or maintenance buildings where occupants are much less satisfied with the air temperature than in other maintenance buildings. Buildings in the "Never Satisfied" category require the most immediate attention. Note that in Building 33010 a high percentage of respondents indicated they were never or almost never satisfied in both the summer and the winter.

Never Satisfied: High percentage of respondents "Never" satisfied with air temperature throughout the day. Recommendation: Cooling system operation needs to be analyzed to determine if the number of occupants satisfied with the temperature at all times of the day can be improved.

Administrative Buildings 108 and 33010
Maintenance Building 30009

Decreasing Satisfaction: Respondent satisfaction with work area temperature decreases from morning to afternoon. Recommendation: Cooling system operation needs to be analyzed to determine ways to increase the percentage of occupants satisfied with the temperature as the day progresses.

Administrative Buildings 1001, 410, 91012, 4213, 4227, and 39009
Maintenance Buildings 88036, 40001, and 32023

Unchanging Satisfaction Level: No major change in the distribution of respondent satisfaction with air temperature throughout the day. Conclusion: The distribution of respondent satisfaction for Building 28000 indicates a high percentage of respondents in the "Usually" and "Always" categories throughout the day. Performance of the cooling system might be analyzed to determine if it can be operated to increase the percentage of respondents "Always" satisfied.

Administrative Building 28000

Always Satisfied: High percentage of respondents "Always" satisfied with air temperature throughout the day. Conclusion: The cooling systems in buildings in this category are maintaining temperatures that satisfy occupants and might serve as models for establishing performance goals in other buildings.

Administrative Building 23020

Satisfaction with Air Temperature - Winter

In the winter, one would also expect the work area temperature to be cool in the morning if the heating system was turned down during the night. The work area temperature, and building occupant satisfaction with the temperature, would increase as the day progressed. Exhibit 2.15B confirms that the percentage of respondents in both administrative and maintenance buildings saying they are "Never" satisfied with the air temperature in the work area is highest in the morning. Anecdotal information gained during the in-person interviews also supports the response, with building occupants indicating that it often took some time in the morning for a boiler to heat up a work area.

The following, derived from Exhibit 2.15B for building occupant satisfaction with work area air temperature, divides the buildings surveyed into three categories of respondent satisfaction to determine which buildings may have heating system performance problems. Those listed in the "Never Satisfied" category require the most immediate attention.

Never Satisfied: High percentage of respondents "Never" satisfied with air temperature throughout the day. Recommendation: The performance of the heating system in buildings in this category should be checked.

Administrative Building 33010, 108

Increasing Satisfaction: Respondent satisfaction with work area temperature increases as the day progresses. Recommendation: Heating system operation needs to be analyzed to determine if the number of occupants satisfied with the temperature in the morning can be improved.

Administrative Buildings 1001, 28000, 410, 91012, 4213, and 4227
Maintenance Buildings 88036, 40001, 32023, 9553, and 30009

Always Satisfied: High percentage of respondents "Always" satisfied with air temperature throughout the day. Conclusion: The heating systems in buildings in this category are maintaining temperatures that satisfy occupants and might serve as models for establishing performance goals in other buildings.

Administrative Buildings 23020 and 39009

Question 4: Respondents' capability to regulate temperature in their work area

Exhibit 2.16 indicates that most survey respondents in administrative buildings, with the exception of Administrative Building 4213, are unable to regulate work area temperature. In contrast, respondents in maintenance buildings tended to indicate they could regulate work area temperature. In the summer, respondents in maintenance areas are probably using fans to regulate their comfort level. Responses imply they tend not to move the fans, increase the number of operating fans, or apply other temperature regulating strategies frequently. In three of the five maintenance buildings surveyed, many respondents indicated they never regulate the temperature. In the winter, respondents in Maintenance Buildings 88036, 40001, and 32023 regulate the temperature more than they do in the summer. Respondents in Maintenance Building 30009 regulate the temperature in the winter less frequently than they do in the summer.

Conclusions/Recommendations

The heating and cooling systems in Administrative Building 4213 might be checked to determine operating strategies that would reduce the need for frequent temperature control setting changes.

The configuration of maintenance buildings (e.g., exposure of bays to the outside environment) is such that more frequent temperature control setting changes may be expected.

Question 5: Impact of sun on the comfort level of the respondent's work area (only respondents with windows in their work area)

Exhibit 2.17 shows that in most administrative buildings surveyed a majority of respondents with windows in the work area do not think that the sun has an impact on the work area air temperature. The exceptions to this response are Administrative Buildings 91012, 39009, and 4227.

In contrast, the exhibit indicates that respondents with work area windows in maintenance buildings, which are not fully serviced by central air conditioning or central heating, do often feel that the sun has an impact on work area temperature, the exception being Maintenance Building 32023.

Conclusions/Recommendations

Investigate means for reducing the impact of the sun on work areas with windows in Administrative Buildings 91012, 39009, and 4227. Options might include glazing with a lower shading coefficient, inspection of the cooling system in the work area to ensure that it is operating correctly, or education of occupants in work areas with windows regarding the use of window shading devices to reduce work area heat gain.

Questions 6 and 7: Respondents' use of supplementary heating and cooling sources in the work area

Exhibit 2.18 indicates that a majority of respondents in administrative buildings do not use supplementary heating sources. During the in-person interviews respondents in several buildings indicated that there were rules forbidding the use of such heating sources. Supplementary heating sources are used only to a limited extent by respondents in maintenance buildings. In both administrative and maintenance buildings electric space heaters are the primary source of supplementary heat.

The exhibit shows that respondents in both administrative and maintenance buildings use supplementary cooling sources to regulate air temperature, with fans being mentioned as the primary source of supplementary cooling in all buildings except Administrative Building 33010 and Maintenance Buildings 9553 and 30009, where both fans and open windows are used.

Humidity

Question 1: Frequency of feeling comfortable with the humidity level in the work area

Exhibits 2.19A and 2.19B show that respondents tended to be more satisfied with humidity level in the work area in the winter than in the summer, as one would expect given the drier, cooler winter season. Administration Building 33010 is the only exception. The response distribution for this building was the same for summer and winter; however, in both seasons the majority of respondents indicated that they were either "Usually comfortable" [60% of respondents] or "Always comfortable" [20% of respondents].

A higher percentage of respondents from maintenance buildings, which lack central air conditioning, indicated that they were "Never comfortable" with the summer humidity level, compared to respondents in administrative buildings. In the winter, a higher percentage of administrative building respondents, compared to maintenance building respondents, indicated that they were "Always comfortable" with the humidity level.

Administrative buildings where respondents tended to be least satisfied with the humidity level, compared to other administrative buildings, are:

Summer (Exhibit 2.19A): Buildings 39009 and 4227

Maintenance buildings where respondents tended to be least satisfied with the humidity level, compared to other maintenance buildings, are:

Summer (Exhibit 2.19A): A high percentage of respondents in each maintenance building surveyed indicated a low level of comfort because of humidity.

Winter (Exhibit 2.19B): Buildings 88036, 32023, and 30009

Conclusions/Recommendations

See Conclusion/Recommendation for Questions 2, 3, and 4.

Questions 2, 3, and 4: Capability of the respondent to regulate humidity in the work area and respondent's actions taken to adjust the humidity level

While Exhibits 2.19A and 2.19B examined respondents' satisfaction with the summer or winter humidity level, Exhibit 2.20 indicates that in most buildings, administrative or maintenance, over 90% of the respondents can not regulate the humidity. The exception is Maintenance Building 9553, but in this building there were only two respondents, one of whom controls summer humidity by decreasing the air conditioning setting.

In the few buildings where respondents did indicate they could control the summer humidity level, control methods included use of fans, decreasing the air conditioning setting and opening windows to generate a draft. The number of people in each building who did control summer humidity was small, and only one or two of the previously mentioned control methods was used in a given building.

Exhibit 2.20 shows that respondents tended to find the winter humidity level acceptable. Only in Administrative Buildings 28000 and 91012 did respondents indicate use of humidifiers.

Conclusions/Recommendations

Investigate strategies for controlling humidity level, especially in the summer, for the administrative and maintenance buildings least satisfied with the humidity level (Question 1).

Ventilation

Questions 1 and 2: Respondents' description of work area air quality; respondents' indication regarding whether work area air quality contributes to health problems

Exhibit 2.21 shows that in only one administrative building (Building 23020) and in no maintenance buildings did more than 50% of respondents rate air quality in the "Excellent" range. Based on review of the exhibit, respondents in the following buildings were least satisfied with the air quality (High percentage of respondents rated air quality in the "Poor" range, and that percentage was higher than the percentage of respondents rating air quality in the "Excellent" range.):

Administrative Buildings 1001 and 108
Maintenance Buildings 40001, 9553, 88036, and 32023

Descriptions of the "Poor" air quality given by respondents in these buildings included:

Building 1001 (36 responses out of 143 respondents): After a few hours in building, respondent gets headaches; air circulation in the basement is not good; air does not circulate enough; air is recirculated/no fresh air; lack of oxygen; no moving air at all/smells stuffy; no fresh air/just recycled; no ventilation/same old stale air; recycled air is stagnant/stale odors; smoke flows in from the smoke room; stagnant, stale, musty air; air has a musty smell/high humidity; air is stale/odors linger; vents covered with dust/smoke from smoke area; vents/filters need to be cleaned

Building 108 (6 responses out of 13 respondents): Age and condition of building/areas without windows are poor; always too hot, causing headaches; dust in system gives nasty odor; have trouble with allergies and headaches/too hot; odors linger

Building 40001 (12 responses out of 25 respondents): One ceiling fan for entire area/need more fans; diesel engine fumes/exhaust system does not remove fumes adequately; dust; welding fumes; fumes from shop area; smoke from smoker

Building 9553 (1 response out of 2 respondents): Exhaust ventilation is broken

Building 88036 (5 responses out of 20 respondents): Dust/dirt; no air circulation without fans; paint shop opening next door/need filter; solvents left in D&F room

Building 32023 (6 responses out of 24 respondents): Poor ventilation; fumes from paint shop; engine exhaust; exhaust fumes bothersome in the winter

In Administrative Building 91012, the responses are evenly divided across the range from "Poor" to "Excellent," which may mean that there are problems in specific parts of the building. Problems noted by the 8 out of 48 respondents who cited reasons for air quality being "Poor" included stale air, no clean air through vents, headaches because of a smoking area nearby, mold/mildew, and stuffiness because of number of people in the work area.

Exhibit 2.22 reviews respondents' beliefs that air quality contributed in any way to various health problems. The exhibit shows a high positive response rate in several buildings, compared to other buildings, consistent with the "Poor" air quality ratings indicated in Exhibit 2.21. Following is a listing of buildings showing the highest level of indication, relative to other buildings surveyed, that ventilation contributes to health problems:

Administrative Buildings 4213, 108, 1001 and 33010
Maintenance Buildings 40001 and 9553

Conclusions/Recommendations

Investigate the performance of the ventilation system in the buildings mentioned above where a high percentage of respondents indicated that air quality was "Poor" or that lack of good air quality contributed to health problems. For instance, ensure that ventilation system filters are clean and that the system incorporates the correct proportion of outside air.

Questions 3 and 4: Respondents' indication regarding whether or not dust is a problem in the work area

Exhibit 2.23 indicates that airborne and settled dust tend not to be problems in administrative buildings. The largest percentage of respondents who indicated that dust was a problem were in Buildings 1001 and 108. A majority of respondents in maintenance buildings, except Buildings 32023 and 9553, did indicate that airborne and settled dust were problems. The performance of ventilation systems and the condition of air filters in these buildings should be checked.

Questions 5, 6 and 7: Respondents' description of air circulation in the work area; respondents' capability to control work area air quality; importance to respondent of being able to control work area air quality

Exhibit 2.24 examines respondents' description of work area air circulation and their ability to control it. Respondents in the following buildings gave air circulation a high percentage "Poor" rating (a "Poor" rating from over 30% of respondents), which in some cases was higher than the "Excellent" rating):

Administrative Buildings 1001, 91012, 39009, 108, and 4227
Maintenance Buildings 88036 and 40001

Exhibit 2.24 indicates that in most buildings there is a large percentage of respondents who believe that the ability to control work area air quality is "Very Important," but the exhibit also indicates that respondents are usually unable to control the air quality, especially in the administrative buildings.

Conclusions/Recommendations

Investigate means of upgrading performance of the ventilation system or of ensuring that air filters are checked on a regular basis, especially for the buildings cited above for "Poor" air circulation.

EXHIBIT 2.14: RESPONDENTS' PRIMARY SOURCE OF HEATING AND COOLING
(Section 3: Heating/Cooling - Air Temperature - Questions 1 and 2)

	Primary Heating Source						Primary Cooling Sources						
	Warm Air - Ventilation Register	Radiator or baseboard	Spot heating (radiant or infrared lamps)	Other	Don't Know	**No Response**	Central air	Room air conditioners	Fans	Windows	Other	Don't Know	**No Response**
Building Number	Percent of Total Answering Question					Percent of Total Respondents	Percent of Total Answering Question						Percent of Total Respondents
ADMINISTRATIVE BUILDINGS													
1001	87	0	0	1	12	0	88	1	1	0	1	8	0
28000	86	2	0	0	12	2	82	8	0	0	0	10	2
410	97	0	0	0	3	0	92	0	3	0	0	5	0
91012	94	0	0	6	0	2	94	2	0	8	2	2	2
39009	93	0	0	0	7	0	89	0	0	0	0	11	0
108	92	0	0	0	8	0	92	0	0	0	0	8	0
23020	95	0	0	0	5	0	95	0	0	0	0	5	0
4213	92	0	0	8	0	0	92	0	8	0	0	0	0
4227	89	0	0	11	0	10	89	0	0	0	11	0	10
33010	100	0	0	0	0	0	100	0	0	0	0	0	0
MAINTENANCE BUILDINGS													
88036	5	0	80	10	5	0	5	5	80	0	10	0	0
40001	20	8	32	40	0	0	24	0	52	4	20	0	0
32023	63	0	17	17	4	0	50	0	4	8	38	0	0
9553	100	0	0	0	0	0	0	50	50	0	0	0	0
30009	20	10	30	30	10	0	0	10	60	30	0	0	0

EXHIBIT 2.15A: RESPONDENT SATISFACTION WITH AIR TEMPERATURE - SUMMER

(Section 3: Heating/Cooling - Air Temperature - Question 3)

	Morning				Midday				Afternoon				Evening			
	Never (1-2)	Usually (3)	Always (4-5)	No Response/ Not Applicable	Never (1-2)	Usually (3)	Always (4-5)	No Response/ Not Applicable	Never (1-2)	Usually (3)	Always (4-5)	No Response/ Not Applicable	Never (1-2)	Usually (3)	Always (4-5)	No Response/ Not Applicable
Building Number	Percent of Total Answering Question			Percent Total Respondents	Percent of Total Answering Question			Percent Total Respondents	Percent of Total Answering Question			Percent Total Respondents	Percent of Total Answering Question			Percent Total Respondents
ADMINISTRATIVE BUILDINGS																
1001	23	41	36	8	40	36	23	10	45	32	23	10	36	38	26	46
28000	17	51	32	20	20	48	32	22	22	45	33	22	12	52	36	35
410	25	57	18	26	36	46	18	26	43	46	11	26	42	53	5	50
91012	23	42	35	10	33	39	28	10	42	39	19	10	20	55	25	58
39009	14	48	38	22	48	38	14	22	53	33	14	22	31	38	31	41
108	42	50	8	8	42	58	0	8	50	50	0	8	33	67	0	31
23020	21	7	72	30	14	14	72	30	14	7	79	30	18	9	73	45
4213	8	58	33	0	8	58	33	0	17	50	33	0	0	60	40	58
4227	10	20	70	0	20	20	60	0	30	30	40	0	25	0	75	60
33010	60	20	20	0	40	20	40	0	80	0	20	0	67	0	33	40
MAINTENANCE BUILDINGS																
88036	16	47	37	5	53	12	35	15	58	21	21	5	56	22	22	55
40001	29	33	38	4	50	33	17	4	67	21	12	4	56	13	31	36
32023	27	36	36	8	42	29	29	13	57	14	29	13	38	31	31	33
9553	50	50	0	0	0	50	50	0	50	0	50	0	0	100	0	50
30009	50	30	20	0	80	20	0	0	70	30	0	0	50	40	10	0

EXHIBIT 2.15B: RESPONDENT SATISFACTION WITH AIR TEMPERATURE - WINTER

(Section 3: Heating/Cooling - Air Temperature - Question 3)

	Morning				Midday				Afternoon				Evening			
	Never (1-2)	Usually (3)	Always (4-5)	No Response/ Not Applicable	Never (1-2)	Usually (3)	Always (4-5)	No Response/ Not Applicable	Never (1-2)	Usually (3)	Always (4-5)	No Response/ Not Applicable	Never (1-2)	Usually (3)	Always (4-5)	No Response/ Not Applicable
Building Number	Percent of Total Answering Question			Percent Total Respondents	Percent of Total Answering Question			Percent Total Respondents	Percent of Total Answering Question			Percent Total Respondents	Percent of Total Answering Question			Percent Total Respondents
ADMINISTRATIVE BUILDINGS																
1001	44	30	26	2	41	32	27	2	34	36	30	2	36	35	28	38
28000	26	41	33	10	20	43	37	10	20	48	32	10	22	46	32	27
410	38	49	13	3	27	57	16	3	27	54	19	3	28	52	20	34
91012	54	28	17	4	46	30	24	4	41	33	26	4	38	33	29	56
39009	27	19	54	37	27	15	58	37	23	23	54	37	21	26	53	30
108	46	54	0	0	46	54	0	0	38	62	0	0	36	55	9	15
23020	21	5	74	5	11	11	78	5	11	6	83	5	13	7	80	25
4213	42	25	33	0	25	42	33	0	17	50	33	0	20	40	40	58
4227	70	10	20	0	30	40	30	0	10	50	40	0	25	50	25	60
33010	80	0	20	0	60	20	20	0	60	20	20	0	33	33	33	40
MAINTENANCE BUILDINGS																
88036	16	42	42	5	11	42	47	5	11	42	47	5	22	44	33	55
40001	50	33	17	4	42	42	16	4	36	52	12	0	44	39	17	28
32023	38	33	29	13	19	43	38	13	18	41	41	8	19	44	37	33
9553	50	50	0	0	0	50	50	0	0	50	50	0	0	100	0	50
30009	40	20	40	0	30	30	40	0	20	40	40	0	30	30	40	0

EXHIBIT 2.16: RESPONDENTS' ABILITY TO REGULATE WORK AREA TEMPERATURE
(Section 3: Heating/Cooling - Air Temperature - Question 4)

	Have Capability to Regulate Work Area Temperature			Frequency of Making Temperature Adjustments, Given the Capability of Regulate Temperature									
				Summer					Winter				
	Yes	No	No Response	Never	Once a week	Once daily	Several times a day	No Response	Never	Once a week	Once daily	Several times a day	No Response
Building Number	Percent of Total Answering Question		Percent of Total Respondents	Percent of Total Answering the Question				Percent of Total Answering "Yes"	Percent of Total Answering the Question				Percent of Total Answering "Yes"
ADMINISTRATIVE BUILDINGS													
1001	16	84	0	29	38	14	19	9	32	32	14	23	4
28000	12	88	2	80	20	0	0	17	67	33	0	0	0
410	16	84	0	0	50	25	25	33	17	50	17	17	0
91012	6	94	2	67	33	0	0	0	50	50	0	0	33
39009	0	100	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
108	0	100	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
23020	5	95	0	100	0	0	0	0	100	0	0	0	0
4213	67	33	0	17	17	67	0	25	25	25	50	0	0
4227	30	70	0	33	33	0	33	0	67	0	0	33	0
33010	20	80	0	100	0	0	0	0	100	0	0	0	0
MAINTENANCE BUILDINGS													
88036	80	20	0	80	0	7	13	6	50	31	6	13	0
40001	48	52	0	36	9	36	18	8	11	22	33	33	25
32023	33	67	0	57	29	14	0	13	13	25	50	13	0
9553	50	50	0	0	0	100	0	0	No Response				100
30009	50	50	0	0	50	50	0	60	20	40	40	0	0

EXHIBIT 2.17: IMPACT OF THE SUN ON WORK AREAS

(Section 3: Heating/Cooling - Air Temperature - Question 5)

	Sun has impact	Sun has no impact	No windows in work area	No Response
Building Number	Percent of Total Answering Question Who Have Windows in Work Area		Percent of Total Respondents	
ADMINISTRATIVE BUILDINGS				
1001	38	62	36	0
28000	38	63	20	2
410	36	64	34	0
91012	50	50	35	2
39009	59	41	15	4
108	14	86	46	0
23020	25	75	40	0
4213	40	60	58	0
4227	60	40	50	0
33010	25	75	20	0
MAINTENANCE BUILDINGS				
88036	75	25	20	0
40001	78	22	8	0
32023	38	62	13	0
9553	100	0	0	0
30009	80	20	0	0

EXHIBIT 2.18: RESPONDENTS' USE OF SUPPLEMENTAL SOURCE OF HEATING AND COOLING

(Section 3: Heating/Cooling - Air Temperature - Questions 6 and 7)

	Use Supplementary Heating Source			Type of Supplementary Heating			Use Supplementary Cooling Source			Type of Supplementary Cooling			
	Yes	No	**No Response**	Electric Space Heater	Kerosene Space Heater	Other	Yes	No	**No Response**	Fans	Windows	Both Fans and Windows	Other
Building Number	Percent of Total Answering Question		Percent of Total Respondents	Percent of Total Using Supplementary Heat			Percent of Total Answering Question		Percent of Total Respondents	Percent of Total Using Supplementary Cooling			
ADMINISTRATIVE BUILDINGS													
1001	8	92	0	92	0	8	46	54	0	100	0	0	0
28000	8	92	2	100	0	0	28	72	2	13	67	20	0
410	3	97	0	100	0	0	37	63	0	43	50	7	0
91012	19	81	2	100	0	0	32	68	2	75	13	6	6
39009	11	89	0	100	0	0	85	15	0	67	8	25	0
108	0	100	0	N/A	N/A	N/A	54	46	0	100	0	0	0
23020	0	100	0	N/A	N/A	N/A	25	75	0	100	0	0	0
4213	25	75	0	100	0	0	42	58	0	80	0	0	20
4227	20	80	0	100	0	0	60	40	0	100	0	0	0
33010	40	60	0	100	0	0	20	80	0	0	0	100	0
MAINTENANCE BUILDINGS													
88036	5	95	0	100	0	0	100	0	0	59	0	7	33
40001	24	76	0	100	0	0	88	12	0	57	0	17	27
32023	21	79	0	100	0	0	35	65	4	67	11	11	11
9553	0	100	0	N/A	N/A	N/A	50	50	0	0	0	100	0
30009	40	60	0	33	0	67	70	30	0	0	0	86	14

EXHIBIT 2.19A: RESPONDENT SATISFACTION WITH THE HUMIDITY LEVEL - SUMMER

(Section 3: Heating/Cooling - Humidity - Question 1)

	Never comfortable (1 or 2)	Usually comfortable (3)	Always comfortable (4 or 5)	**No Response**
Building Number	Percent of Total Answering Question			Percent of Total Respondents
ADMINISTRATIVE BUILDINGS				
1001	22	43	35	3
28000	20	52	27	14
410	21	61	18	13
91012	16	43	41	8
39009	71	17	13	11
108	17	58	25	8
23020	24	24	53	15
4213	25	50	25	0
4227	30	50	20	0
33010	20	60	20	0
MAINTENANCE BUILDINGS				
88036	60	30	10	0
40001	40	56	4	0
32023	43	39	17	4
9553	50	50	0	0
30009	50	50	0	0

EXHIBIT 2.19B: RESPONDENT SATISFACTION WITH THE HUMIDITY LEVEL - WINTER

(Section 3: Heating/Cooling - Humidity - Question 1)

	Never comfortable (1 or 2)	Usually comfortable (3)	Always comfortable (4 or 5)	No Response
Building Number	Percent of Total Answering Question			Percent of Total Respondents
ADMINISTRATIVE BUILDINGS				
1001	16	46	37	2
28000	15	52	33	10
410	17	58	25	5
91012	13	42	44	6
39009	23	23	54	4
108	8	61	31	0
23020	15	30	55	0
4213	25	33	42	0
4227	10	70	20	0
33010	20	60	20	0
MAINTENANCE BUILDINGS				
88036	32	47	21	5
40001	8	79	13	4
32023	29	42	29	0
9553	0	100	0	0
30009	22	78	0	10

EXHIBIT 2.20: RESPONDENTS' USE OF SUPPLEMENTAL SOURCE OF HEATING AND COOLING
(Section 3: Heating/Cooling - Humidity - Questions 2, 3 and 4)

				Action Taken to Adjust Humidity Level - Summer					Action Taken to Adjust Humidity Level - Winter		
	Have Capability to Regulate Humidity			Only Respondents Saying They Have Capability to Regulate Humidity							
	Yes	No	No Response	Humidity Level Acceptable	Use Fan	Decrease AC Setting	Open Window; Generate Draft	No Response	Humidity Level Acceptable	Use Humidifier	No Response
Building Number	Percent of Total Answering Question		Percent of Total Respondents	Percent of Total Respondents Answering Question				Percent of Total Respondents	Percent of Total Respondents Answering Question		Percent of Total Respondents
ADMINISTRATIVE BUILDINGS											
1001	1	99	0	0	50	50	0	0	100	0	50
28000	4	96	4	0	33	67	0	0	50	50	0
410	0	100	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
91012	6	94	2	33	67	0	0	0	50	50	33
39009	0	100	4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
108	0	100	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
23020	5	95	0	100	0	0	0	0	100	0	0
4213	8	92	0	0	100	0	0	0	100	0	0
4227	0	100	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
33010	0	100	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MAINTENANCE BUILDINGS											
88036	10	90	0	0	100	0	0	0	100	0	0
40001	0	100	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
32023	4	96	0	0	0	0	100	0	100	0	0
9553	50	50	0	0	0	100	0	0	100	0	0
30009	0	100	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

EXHIBIT 2.21: RESPONDENT DESCRIPTION OF AIR QUALITY

(Section 3: Heating/Cooling - Ventilation - Question 1)

	Poor (1 or 2)	Fair (3)	Excellent (4 or 5)	No Response
Building Number	Percent of Total Answering Question			Percent of Total Respondents
ADMINISTRATIVE BUILDINGS				
1001	33	40	27	2
28000	15	43	41	10
410	14	51	35	3
91012	32	32	36	2
39009	20	48	32	7
108	46	39	15	0
23020	11	17	72	10
4213	17	66	17	0
4227	20	40	40	0
33010	0	80	20	0
MAINTENANCE BUILDINGS				
88036	33	44	22	10
40001	58	29	13	4
32023	25	58	17	0
9553	100	0	0	0
30009	22	44	33	10

EXHIBIT 2.22: RESPONDENT BELIEF THAT VENTILATION PROBLEMS CONTRIBUTE TO HEALTH PROBLEMS
(Section 3: Heating/Cooling - Ventilation - Question 2)

	Colds			Headaches			Allergies			Other		
	Yes	No	No Response	Yes	No	No Response	Yes	No	No Response	Yes	No	No Response
Building Number	Percent of Total Answering Question		Percent of Total Respondents	Percent of Total Answering Question		Percent of Total Respondents	Percent of Total Answering Question		Percent of Total Respondents	Percent of Total Answering Question		Percent of Total Respondents
ADMINISTRATIVE BUILDINGS												
1001	43	57	0	47	53	0	45	55	0	12	88	0
28000	34	66	2	26	74	2	24	76	2	0	100	2
410	34	66	0	32	68	0	16	84	0	5	95	0
91012	34	66	2	36	64	2	34	66	2	11	89	2
39009	42	58	4	42	58	4	35	65	4	8	92	4
108	46	54	0	54	46	0	46	54	0	31	69	0
23020	42	58	5	32	68	5	32	68	5	5	95	5
4213	42	58	0	58	42	0	58	42	0	0	100	0
4227	20	80	0	10	90	0	30	70	0	0	100	0
33010	60	40	0	0	100	0	20	80	0	0	100	0
MAINTENANCE BUILDINGS												
88036	22	78	10	33	67	10	39	61	10	22	78	10
40001	48	52	0	68	32	0	64	36	0	36	64	0
32023	25	75	0	33	67	0	21	79	0	4	96	0
9553	0	100	0	50	50	0	0	100	0	0	100	0
30009	11	89	10	22	78	10	33	67	10	0	100	10

EXHIBIT 2.23: RESPONDENTS' INDICATION REGARDING WHETHER DUST IS A PROBLEM IN THE WORK AREA

(Section 3: Heating/Cooling - Ventilation - Questions 3 and 4)

	Airborne dust is a problem			Settled dust is a problem		
	Yes	No	**No Response**	Yes	No	**No Response**
Building Number	Percent of Total Answering Question		Percent of Total Respondents	Percent of Total Answering Question		Percent of Total Respondents
ADMINISTRATIVE BUILDINGS						
1001	27	73	3	34	66	2
28000	14	86	4	17	83	6
410	13	87	0	16	84	0
91012	15	85	2	20	80	4
39009	15	85	0	30	70	0
108	38	62	0	38	62	0
23020	11	89	10	16	84	5
4213	17	83	0	25	75	0
4227	10	90	0	20	80	0
33010	0	100	0	0	100	0
MAINTENANCE BUILDINGS						
88036	89	11	10	83	17	10
40001	84	16	0	75	25	4
32023	4	96	0	21	79	0
9553	50	50	0	50	50	0
30009	67	33	10	89	11	10

EXHIBIT 2.24: RESPONDENT DESCRIPTION OF AIR CIRCULATION IN WORK AREA
(Section 3: Heating/Cooling - Ventilation - Questions 5, 6, and 7)

	Respondent Description of Work Area Air Circulation				Respondent Is Able to Control Air Quality			Importance to Respondent of Ability to Control Work Area Air Quality			
	Poor (1 or 2)	Fair (3)	Excellent (4 or 5)	No Response	Yes	No	No Response	Not Important (1 or 2)	Neutral (3)	Very Important (4 or 5)	No Response
Building Number	Percent of Total Answering Question			Percent of Total Respondents	Percent of Total Answering Question		Percent of Total Respondents	Percent of Total Answering Question			Percent of Total Respondents
ADMINISTRATIVE BUILDINGS											
1001	39	37	24	2	3	97	2	13	32	55	1
28800	19	44	38	6	18	82	4	13	42	46	6
410	24	55	21	0	5	95	0	8	47	45	0
91012	36	32	32	2	4	96	6	13	34	53	2
39009	38	46	15	4	4	96	0	0	41	59	0
108	33	58	8	8	0	100	0	8	15	77	0
23020	16	26	58	5	11	89	5	11	21	68	5
4213	25	50	25	0	25	75	0	9	36	55	0
4227	50	50	0	0	10	90	0	0	50	50	0
33010	20	60	20	0	0	100	0	0	0	100	0
MAINTENANCE BUILDINGS											
88036	33	50	17	10	29	71	15	0	22	78	10
40001	56	44	0	0	32	68	0	4	16	80	0
32023	21	54	25	0	29	71	0	0	42	58	0
9553	0	100	0	0	50	50	0	0	50	50	0
30009	22	67	11	10	0	100	10	0	56	44	10

NOISE

Questions 1 and 2: Respondents' indication regarding whether certain potential work area noise sources interfere with work activities; actions taken by respondent to reduce noise

Exhibits 2.25A through 2.25C indicate that in general respondents do not believe that HVAC noise and fluorescent lighting buzz interfere with work activities. There were incidents of respondents in Administrative Buildings 1001, 410, 108, and 23020 and in Maintenance Building 88036 saying that HVAC noise interfered with work activities "Very much." There was one incident in each of Administrative Buildings 1001 and 91012 where the respondent indicated he/she felt that fluorescent lighting buzz interfered with work activities "Very much."

The percentage of respondents indicating that "Other Work Area Noises" interfered with work activities tended to be higher for maintenance buildings than for administrative buildings, except in the case of Maintenance Building 9553, where respondents indicated that "other noise" did not interfere with work activities. The kinds of "other noise" mentioned by administrative building respondents tended to differ from those mentioned by respondents in maintenance buildings. In the administrative buildings, the noise tends to come from office equipment or people talking. Building 33010, a training building, was the only administrative building where a high percentage of respondents said that "other noise" interfered with their work activities "Very much." Respondents in this building were bothered by noise from adjoining classrooms, the bay area, office equipment, and a compressor. The noise is bothersome enough that one respondent uses earplugs. Two other respondents suggested that classrooms should be carpeted and that the walls needed better soundproofing material.

In other administrative buildings a variety of strategies is used to deal with noise, popular methods being to tell people to talk more quietly or to shut an office door. Other methods mentioned included using headphones or turning on a radio, turning off office equipment when not in use. A few respondents indicated an interest in reducing the ring volume on telephones and in installing higher or more office partitions in the work area.

In the maintenance buildings, the primary "other noise" sources are vehicle engines, generators, power equipment, and exhaust fans. Respondents deal with noise by wearing ear plugs or other hearing protection. In a few instances, respondents were able to deal with noise by shutting a door. Some respondents suggested a need for better sound-proofing in work areas.

EXHIBIT 2.25A: RESPONDENT INDICATION THAT HVAC NOISE INTERFERES WITH WORK ACTIVITIES

(Section 4: Noise - Question 1 - HVAC Noise)

	Not at all (1)	(2)	Somewhat (3)	(4)	Very much (5)	No Response
Building Number	Percent of Total Answering Question					Percent of Total Respondents
ADMINISTRATIVE BUILDINGS						
1001	71	8	8	3	9	0
28000	88	8	2	2	0	2
410	84	8	3	0	5	0
91012	89	6	4	0	0	2
39009	81	11	4	4	0	0
108	77	8	8	8	0	0
23020	85	5	5	0	5	0
4213	45	27	18	9	0	8
4227	67	22	11	0	0	10
33010	80	0	20	0	0	0
MAINTENANCE BUILDINGS						
88036	70	5	10	0	15	0
40001	83	13	4	0	0	8
32023	79	8	13	0	0	0
9553	50	0	50	0	0	0
30009	100	0	0	0	0	20

EXHIBIT 2.25B: RESPONDENT INDICATION THAT FLUORESCENT LIGHTING BUZZ INTERFERES WITH WORK ACTIVITIES

(Section 4: Noise - Question 1 - Fluorescent Lighting Buzz)

	Not at all (1)	(2)	Somewhat (3)	(4)	Very much (5)	**No Response**
Building Number	Percent of Total Answering Question					Percent of Total Respondents
ADMINISTRATIVE BUILDINGS						
1001	88	8	3	1	1	1
28000	86	12	0	2	0	2
410	89	5	5	0	0	0
91012	83	9	4	2	2	2
39009	74	22	4	0	0	0
108	75	17	8	0	0	8
23020	95	5	0	0	0	0
4213	73	18	9	0	0	8
4227	67	33	0	0	0	10
33010	80	0	20	0	0	0
MAINTENANCE BUILDINGS						
88036	85	5	10	0	0	0
40001	96	4	0	0	0	8
32023	83	13	4	0	0	0
9553	50	50	0	0	0	0
30009	88	0	13	0	0	20

EXHIBIT 2.25C: RESPONDENT INDICATION THAT OTHER WORK AREA NOISES INTERFERE WITH WORK ACTIVITIES

(Section 4: Noise - Question 1 - Other noise)

	Not at all (1)	(2)	Somewhat (3)	(4)	Very much (5)	No Response
Building Number	Percent of Total Answering Question					Percent of Total Respondents
ADMINISTRATIVE BUILDINGS						
1001	57	11	18	6	7	2
28000	67	10	8	10	4	6
410	58	11	21	0	11	0
91012	57	6	21	9	6	2
39009	62	15	19	4	0	4
108	69	15	8	8	0	0
23020	53	16	21	5	5	5
4213	58	8	0	17	17	0
4227	60	20	10	0	10	0
33010	40	0	20	0	40	0
MAINTENANCE BUILDINGS						
88036	30	10	35	10	15	0
40001	29	8	13	13	37	4
32023	46	8	33	4	8	0
9553	100	0	0	0	0	0
30009	50	0	0	40	10	0

ENERGY AWARENESS

Question 1: Does respondent know about the Fort Hood Energy Awareness Program?

Exhibit 2.26 indicates a need for increased advertising of the Fort Hood Energy Awareness Program; only in Administrative Buildings 108, 23020, 4213, 4227, and 33010 are 75% or more of respondents aware of the program. Energy Conservation Officers for buildings showing lower respondent awareness of Fort Hood's Energy Awareness Program need to make a special effort to increase awareness.

Question 2: Has respondent heard of the term "peak demand?"

The following breakdown, derived from Exhibit 2.27, indicates that respondents in administrative buildings are more likely to have heard the term "peak demand" than are respondents in maintenance buildings. Exhibit 2.27 also indicates that of those who have heard the term "peak demand," respondents in administrative buildings are more likely to understand the meaning of the term than are respondents in maintenance buildings.

75% or more of respondents have heard of the term "peak demand:"

Administrative Buildings 91012, 108, 4213, 4227, and 33010
Maintenance Building 9553

50% to 74% of respondents have heard of the term "peak demand:"

Administrative Buildings 1001, 410, 39009, and 23020
Maintenance Building 40001

Under 50% of respondents have heard of the term "peak demand:"

Administrative Building 28000
Maintenance Buildings 88036, 32023, and 30009

Conclusions/Recommendations

ECOs for maintenance buildings in particular and for Administrative Building 28000 need to make an effort to explain to building occupants the term "peak demand" and the significance of the impact of peak demand on Fort Hood's electricity bills.

Question 3: Does respondent know if he/she has an Energy Conservation Officer (ECO) or Building Energy Monitor (BEM) assigned to his/her unit or office?

Exhibit 2.28 indicates that in all administrative and maintenance buildings surveyed less than 50% of respondents know whether they have an ECO or BEM. Even when respondents knew they had an ECO or BEM they did not always know the person's name, particularly in Administrative Buildings 39009 and 23020 and Maintenance Building 32023.

Conclusions/Recommendations

ECOs and BEMs need to meet with building occupants, make them aware of the Fort Hood Energy Awareness Program, explain the ECO/BEM role in the program, relate minimum energy saving standards, and maintain energy awareness through such activities as an energy awareness bulletin board that includes the ECO or BEM name and telephone number, energy saving tips and standards, and energy savings accomplishments.

Question 4: Does respondent know of any steps taken to save energy in his/her building?

Exhibit 2.29 indicates that in most administrative buildings and in all maintenance buildings less than 50% of survey respondents were aware of any steps taken to save energy in the building containing their work area.

Of the respondents in each building who were aware of steps taken to save energy, most either noticed no change to work area quality and comfort or noticed a positive change. Responses indicating that there was a negative impact on work area quality and comfort were limited to administrative buildings and represent only nine respondents in five buildings. Examples of explanations for a response of "Negatively" include:

- Building 1001 (4 responses of "Negatively" out of 33 respondents answering the question [143 respondents total for the building]): Respondents mentioned that the building's climate control is inconsistent and that the building is always too hot.

- Building 4227 (1 response of "Negatively" out of 3 respondents answering the question [10 respondents total for the building]): Lamps in fixtures were decreased, which decreased the lighting level. Exhibit 2.11 indicates that 80% of the respondents in this building said they were "Always" satisfied with lighting quality, so this respondent's observation is in the minority.

Two respondents answering "Negatively" did not provide an explanation that related to the impact of an energy saving project on their work area. In Building 91012, the one respondent answering "Negatively" indicated that work was interrupted by janitors, an interruption that would have only a temporary impact on the work area. In Building 33010, the one respondent answering "Negatively" indicated as a reason for the response that no action was taken on work orders.

This response is irrelevant to the question; it is a comment on the need to take action on work orders so that energy can be saved.

Conclusions/Recommendations

The ECO or BEM for the building needs to keep occupants posted regarding energy saving activities and needs to raise building occupant consciousness regarding the need to develop new energy saving opportunities. Responses to the question suggest that building occupants who are made aware of steps taken to save energy in the building will at least notice no change and may think of the change as positive.

Question 5: Are lights and appliances in the work area and surrounding work areas consistently turned off when they are not in continuous use?

Exhibit 2.30 indicates that only in Administrative Buildings 23020, 4227, and 33010 and Maintenance Buildings 32023 and 30009 do 60% or more of respondents say that lights and appliances in the work area are "Always" turned off when not in continuous use, a response rate which is combined with a low percentage of respondents (20% or less) indicating that lights and appliances are "Never" turned off when not in continuous use. The other buildings surveyed tended to have higher response levels on the parts of the response scale from "Never" to "Usually."

Conclusions/Recommendations

Building ECOs and BEMs need to raise occupant awareness of the importance of turning off lights and appliances in the work area when not in continuous use. ECO/BEM actions to raise awareness and to improve behavior in this area include labeling light switches and appliances with reminders to turn them off or posting times during which lights and appliances should definitely be turned off.

Question 6: Would any incentives (e.g., money, etc.) offered to save energy in the building motivate the respondent to alter his/her current behavior or work patterns?

The following, derived from Exhibit 2.31, indicates that respondents in most buildings tended to be rather evenly divided in their opinions regarding whether energy saving incentive programs would cause them to change their current behavior or work patterns to save energy.

61% to 71% of respondents believe that incentives would motivate them to alter current behavior or work patterns to save energy

Administrative Buildings 28000, 410, 108, 23020, and 4227
Maintenance Building 32023

45% to 60% of respondents believe that incentives would motivate them to alter current behavior or work patterns to save energy

Administrative Buildings 1001, 91012, 39009, 4213, and 33010
Maintenance Buildings 88036, 40001, 9553, and 30009

Conclusions/Recommendations

The preceding results suggest that an incentives program would not motivate many individuals at Fort Hood to alter their behavior to save energy. Based on the in-person interviews, these respondents fall into two groups: (1) those who do not need an incentives program to motivate them to follow energy saving practices and (2) those who do not think an incentives program would motivate them to alter their current behavior or work patterns to save energy. The ECOs and BEMs at Fort Hood need to make building occupants aware that they are open to energy saving suggestions and that energy savings projects will not be implemented in ways that reduce comfort and productivity. ECOs and BEMs should take steps to ensure that building occupants are aware constantly of the importance of energy conservation. When they see the heightened interest taken by the Fort Hood command in behavior that saves energy, those who indicate that incentives do not motivate their energy conservation activity should be encouraged to continue current energy saving practices and to submit new energy saving ideas to the ECO or BEM. If the activities of such people are not sufficient to meet Fort Hood's energy saving goals, an incentive program might be considered to encourage broader energy saving behavior.

Question 7: Does respondent have suggestions for saving energy in his/her building?

The following, derived from Exhibit 2.32, indicate that in most buildings several respondents, though usually not the majority of respondents, did have suggestions for saving energy. These suggestions may serve as starting points for investigating energy conservation opportunities in specific buildings:

Administrative Buildings

Building 1001: (1) turn off lights when not in use; (2) do not use so many lights; (3) reconfigure hall lights such that one switch can turn off every other fixture; (4) repair interior and exterior caulking around windows; (5) turn off computers and work area appliances when not in use; (6) determine which lights are non-essential and reduce wattage of lamps in such fixtures; (7) install occupancy sensors in various areas; (8) establish consistent climate control; install heat blanket at door in the main entry

Building 28000: (1) turn off lights and computers when not in use; (2) keep windows in offices closed; (3) install occupancy sensors; (4) limit hours staff can work in building

Building 410: (1) install occupancy sensors; (2) turn off lights and equipment when not in use; (3) install carpet on cold floors; (3) decrease number of lights; currently have more lights than needed; (4) initiate a system where occupants would remind each other to turn off lights (If lights were on in an unoccupied area, the person observing this would turn lights off and leave a reminder for person in charge of area to turn off lights. The person would get some kind of incentive credit for taking this action, for instance a token system where tokens could be traded in for some kind of prize.); (5) install thermostats with automatic temperature set-back to decrease heating load in certain areas

Building 91012: (1) turn off lights and appliances when not in use; (2) balance the air conditioning system; (3) install occupancy sensors; (4) provide energy awareness training; (5) repair HVAC controls; (6) increase interior and exterior wall insulation; (7) reduce number of lights in hallways (e.g., delamping of fixtures); (8) reduce hot water temperature; (9) repair north door so that it shuts; (10) check and repair window caulking; (11) when shifting walls in building renovations, pay attention to location of vents (currently, no attention is paid to vent location)

Building 39009: (1) adjust heating controls (always too warm); (2) turn off lights and appliances when not in use; (3) improve ventilation (currently pockets of hot and cold); (4) install occupancy sensors; (5) provide light switches that improve capability to control smaller batches of lights than is currently possible

Building 108: (1) improve control of lighting and ventilation; (2) upgrade and/or repair HVAC system; (3) go to a four day work week; (4) install lighting switches capable of controlling zones of lighting

Building 23020: (1) turn off air conditioning at night; (2) install occupancy sensors with override switch; (3) install thermostats in each room to control heating; (4) turn off lights when not in use

Building 4213: (1) turn off lights in excess of those needed to provide adequate lighting; (2) turn off heating and air conditioning when people not in building; (3) keep windows and doors closed when air conditioning or heating is operating

Building 4227: (1) upgrade insulation and HVAC system (consider zoning the HVAC system); (2) replace cinder block missing in crawl space; (3) turn off lights when not in use; (4) install occupancy sensors; (5) install/repair weatherstripping on door

Building 33010: (1) improve HVAC controls and access to controls; (2) improve classroom ventilation and temperature control; (3) install sun shade around windows or install tinted windows; (4) increase amount of natural light

Maintenance Buildings

Building 88036: (1) institute four day work week; (2) reduce ceiling height; (3) keep thermostat at fixed temperature; (4) install electric eye door opener; (5) move heaters to lower position on walls, closer to work area; (6) turn down hot water temperature; (7) use atriums for fork lift entry in the winter

Building 40001: (1) close doors/bay doors in winter/repair doors that will not close; (2) upgrade lighting with higher efficiency technology; (3) turn off lights, fans, and other equipment when not in use; (4) replace windows with solar sunscreens; (5) install windows to reduce lighting requirement; (6) remove partitions that cause poor air circulation

Building 32023: (1) turn off lights when not in use; (2) install solar panels for heating; (3) conduct proper preventive maintenance on heating and cooling systems; (3) reduce the size of the zone controlled by a given heating/cooling thermostat

Building 9553: (1) fix all lighting and install light switches

Building 30009: (1) change lights (may be an indication that fixtures are not providing adequate lighting because lamps are burned out and not replaced or because fluorescent lights are flickering)

Question 8: What does the term "energy conservation" mean to the respondent?

This question was asked to determine if respondents had a negative impression of the term "energy conservation." Such knowledge is useful since the support of all occupants of Fort Hood's buildings is needed to reach MEIP energy saving goals. Exhibit 2.33 indicates that most respondents in each building chose the option, "Saves you, and the Army, money," to define the term energy conservation. Relatively few respondents singled out the negative "Too hot in the summer, too cold in the winter" to define the term, though many respondents did chose the definition "All of the preceding," which includes the negative definition. ECOs and BEMs should concentrate on raising building occupant awareness of energy conservation as a set of activities that save energy without diminishing building occupant comfort and productivity.

EXHIBIT 2.26: RESPONDENTS' AWARENESS OF FORT HOOD ENERGY AWARENESS PROGRAM

(Section 5: Energy Awareness - Question 1)

	Aware	Not Aware	No Response
Building Number	Percent of Total Answering Question		Percent of Total Respondents
ADMINISTRATIVE BUILDINGS			
1001	64	36	0
28000	50	50	2
410	50	50	0
91012	57	43	2
39009	52	48	0
108	77	23	0
23020	75	25	0
4213	75	25	0
4227	90	10	0
33010	80	20	0
MAINTENANCE BUILDINGS			
88036	63	37	5
40001	72	28	0
32023	33	67	0
9553	0	100	0
30009	60	40	0

EXHIBIT 2.27: RESPONDENTS WHO HAVE HEARD THE TERM "PEAK DEMAND"
(Section 5: Energy Awareness - Question 2)

	Have heard the term	Have not heard the term	No Response	Do Understand meaning of the term "peak demand"	Do Not Understand Meaning of term "peak demand"	No Response
Building Number	Percent of Total Answering Question		Percent of Total Respondents	Percent of Total Answering the Question Who Have Heard of the Term "Peak Demand"		Percent of Total Respondents Who Have Heard of the Term "Peak Demand"
ADMINISTRATIVE BUILDINGS						
1001	68	32	0	82	18	1
28000	45	55	4	91	9	0
410	74	26	0	89	11	4
91012	77	23	2	85	15	6
39009	52	48	0	100	0	7
108	85	15	0	82	18	0
23020	50	50	0	100	0	0
4213	83	17	0	80	20	0
4227	100	0	0	70	30	0
33010	100	0	0	100	0	0
MAINTENANCE BUILDINGS						
88036	47	53	5	67	33	5
40001	64	36	0	75	25	0
32023	33	67	0	63	38	0
9553	100	0	0	50	50	0
30009	20	80	0	100	0	0

EXHIBIT 2.28: RESPONDENTS TEND NOT TO KNOW IF THEY HAVE AN ECO OR BEM
(Section 5: Energy Awareness - Question 3)

				Only Respondents Who Know They Have an ECO/BEM		
	Know They Have an ECO or BEM	Do Not Know If They Have an ECO or BEM	No Response	Know Name of ECO/BEM	Do Not Know Name of ECO/BEM	No Response
Building Number	Percent of Total Answering Question		Percent of Total Respondents	Percent of Total Answering Question		Percent of Total Respondents Who Know They Have an ECO/BEM
ADMINISTRATIVE BUILDINGS						
1001	15	85	0	69	31	27
28000	28	72	2	67	33	14
410	24	76	0	80	20	44
91012	24	76	6	60	40	9
39009	31	69	4	17	83	25
108	8	92	0	100	0	0
23020	25	75	0	50	50	20
4213	8	92	0	N/A	N/A	100
4227	10	90	0	0	100	0
33010	25	75	20	100	0	0
MAINTENANCE BUILDINGS						
88036	42	58	5	88	13	0
40001	24	76	0	80	20	17
32023	8	92	0	50	50	0
9553	0	100	0	N/A	N/A	N/A
30009	10	90	0	100	0	0

EXHIBIT 2.29: RESPONDENTS' AWARENESS OF STEPS TAKEN TO SAVE ENERGY IN THEIR BUILDING
(Section 5: Energy Awareness - Question 4)

	Awareness of Any Steps Taken to Save Energy in Building Containing Respondent's Work Area			If Aware of Steps Taken to Save Energy, Respondent's Assessment of Impact on Work Area Quality and Comfort			
	Aware of steps taken	Not aware of steps taken	**No Response**	Positive	Negative	No Change Noticed	**No Response**
Building Number	Percent of Total Answering Question		Percent of Total Respondents	Percent of Total Answering Question			Percent of Total Respondents Aware of Steps Taken to Save Energy
ADMINISTRATIVE BUILDINGS							
1001	22	78	0	24	12	64	0
28000	30	70	2	29	14	57	7
410	32	68	0	45	0	55	8
91012	21	79	2	10	10	80	0
39009	19	81	0	40	0	60	0
108	23	77	0	33	0	67	0
23020	65	35	0	38	0	62	0
4213	17	83	0	50	0	50	0
4227	30	70	0	67	33	0	0
33010	80	20	0	25	25	50	0
MAINTENANCE BUILDINGS							
88036	39	61	10	43	0	57	0
40001	20	80	0	60	0	40	0
32023	21	79	0	40	0	60	0
9553	0	100	0	N/A	N/A	N/A	N/A
30009	10	90	0	0	0	100	0

EXHIBIT 2.30: RESPONDENTS' AWARENESS OF FREQUENCY WITH WHICH LIGHTS AND APPLIANCES IN THE WORK AREA ARE TURNED OFF IF NOT IN CONTINUOUS USE

(Section 5: Energy Awareness - Question 5)

	Never (1 or 2)	Usually (3)	Always (4 or 5)	No Response
Building Number	Percent of Total Answering Question			Percent of Total Respondents
ADMINISTRATIVE BUILDINGS				
1001	32	39	30	1
28000	24	40	36	2
410	37	47	16	0
91012	38	36	26	2
39009	30	44	26	0
108	23	62	15	0
23020	20	20	60	0
4213	33	33	33	0
4227	0	40	60	0
33010	0	40	60	0
MAINTENANCE BUILDINGS				
88036	56	22	22	10
40001	40	32	28	0
32023	12	21	67	0
9553	50	0	50	0
30009	11	22	67	10

EXHIBIT 2.31: RESPONDENTS' BELIEF THAT INCENTIVES WOULD CAUSE THEM TO CHANGE ENERGY SAVING BEHAVIOR

(Section 5: Energy Awareness - Question 6)

	Incentives would impact behavior	Incentives would not impact behavior	**No Response**
Building Number	Percent of Total Answering Question		Percent of Total Respondents
ADMINISTRATIVE BUILDINGS			
1001	51	49	1
28000	64	36	8
410	66	34	0
91012	48	52	4
39009	59	41	0
108	67	33	8
23020	70	30	0
4213	45	55	8
4227	67	33	10
33010	60	40	0
MAINTENANCE BUILDINGS			
88036	55	45	0
40001	50	50	4
32023	71	29	0
9553	50	50	0
30009	50	50	0

EXHIBIT 2.32: RESPONDENTS WHO HAVE SUGGESTIONS FOR SAVING ENERGY

(Section 5: Energy Awareness - Question 7)

	Do have suggestion	Do Not Have Suggestion	**No Response**
Building Number	Percent of Total Answering Question		Percent of Total Respondents
ADMINISTRATIVE BUILDINGS			
1001	32	68	1
28000	24	76	4
410	38	62	3
91012	41	59	8
39009	40	60	7
108	62	38	0
23020	35	65	0
4213	56	44	25
4227	60	40	0
33010	80	20	0
MAINTENANCE BUILDINGS			
88036	50	50	0
40001	42	58	4
32023	29	71	0
9553	50	50	0
30009	11	89	10

EXHIBIT 2.33: RESPONDENTS' UNDERSTANDING OF THE TERM "ENERGY CONSERVATION"
(Section 5: Energy Awareness - Question 8)

	Saves you, and the Army, money	Lessens impact on environment	Too hot in the summer, too cold in the winter	All of the preceding	None of the preceding	No Response
Building Number	Percent of Total Answering Question					Percent of Total Respondents
ADMINISTRATIVE BUILDINGS						
1001	54	20	1	20	5	0
28000	45	11	2	40	2	8
410	68	8	0	18	5	0
91012	47	19	4	23	6	2
39009	58	19	0	23	0	4
108	62	8	0	31	0	0
23020	50	20	0	20	10	0
4213	75	17	8	0	0	0
4227	70	10	0	20	0	0
33010	60	0	0	40	0	0
MAINTENANCE BUILDINGS						
88036	60	5	5	30	0	0
40001	48	8	4	32	8	0
32023	54	21	4	17	4	0
9553	100	0	0	0	0	0
30009	60	20	0	20	0	0

3. SURVEY ANALYSIS - ALL RESPONDENTS/ALL BUILDINGS

Following is a summary of survey results, by question, for all respondents/all buildings. This summary is meant to set a baseline for building-specific analysis. Results for specific buildings are more likely to highlight specific problems with lighting, heating, cooling, ventilation, humidity, and noise that are hidden in the all respondent/all building results.

Results are recorded as a percent of total surveys returned, including "No response" and "Not Applicable."

Section 1: General Questions

2. Work areas with windows vs. areas without windows

   60% of respondents (276 surveys) have work area in interior or outside wall without window space

   39% of respondents (181 surveys) had work areas with windows.

   1% of respondents (5 surveys) did not answer the question.

Section 2: Lighting

1. There is no strong negative preference for either artificial or natural light. On a scale of 1 (Never prefer) to 5 (Always prefer), the following preferences were recorded:

	Artificial Light	Natural Light
Negative preference (1 or 2)	14% (64)[1]	12% (57)
Positive preference (3 through 5)	73% (336)	68% (312)
No response	13% (62)	20% (93)

   Analysis of questions 2 and 3 is restricted to the 181 respondents who indicated they had windows in their work area.

2. Most respondents with windows do have a shading device of some kind to control natural light brightness, as indicated by the following results:

Blinds or window shading devices <u>are</u> available	74% (133)
Blinds or window shading devices <u>are not</u> available	18% (33)
No response	8% (15)

[1] Numbers in parentheses represent number of surveys.

3. Respondents with windows in their work area require artificial light to supplement natural light, primarily because natural lighting is not adequate, as indicated by the following results:

Do supplement natural light with artificial light	84% (152)
Do not supplement natural light with artificial light	9% (17)
No response	7% (12)

Reason for supplementing natural light with artificial light:

Natural light not adequate	56% (100)
Feel more comfortable with additional artificial light	21% (38)
Artificial light reduces glare or reflection on the computer screen	15% (26)
Other reasons[2]	8% (15)

5. In general, people can not control the brightness of artificial light.

Can control brightness	17% (78)
Can't control brightness	83% (384)

Of those who say they can control lighting brightness, 26 respondents indicate they have dimmer control and 51 respondents indicate a variety of other responses, popular ones being use of multiple light switches or desk lamps.

6. Respondents with the capability to control lighting do not seem to use the capability.

Frequency of using lighting control on a 1 (Never) to 5 (Often) scale

1 to 2	57% (43)
3	16% (12)
4 to 5	27% (21)

[2] Other reasons cited tend to be redundant with the three specific choices given in the question.

7. Respondents use lighting control primarily to adjust lighting brightness, as indicated by the following responses regarding conditions that cause the respondent to use lighting controls:

Light too bright	22% (23)
Not enough light	29% (31)
Glare	15% (16)
Light uneven/shadows	5% (5)
Other	10% (11)
No response/Feel no need for lighting control	19% (20)

8. Fluorescent light is the primary lighting option, especially in administrative buildings.

9. Respondents were generally very satisfied with their lighting quality, as indicated by the following responses on a scale of 1 (Never) to 5 (Always):

1 to 2	11% (50)
3	24% (109)
4 to 5	65% (301)
No response	Negl. (2)

10. Respondents tended to be for occupancy sensors in all areas mentioned in the survey. On a scale of 1 (Against) to 5 (For) and "Not Applicable" the results follow:

	1-2	3	4-5	N/A
Bathroom	17%	12%	61%	10%
Office workspace	26%	21%	38%	15%
Conference rooms	10%	15%	60%	15%
Recreation areas	9%	13%	47%	31%
Break areas	10%	15%	55%	20%

Comments made by respondents less interested in occupancy sensors included not liking to enter a dark area and thinking that occupancy sensors in break areas or office areas with frequent in/out traffic would cause lights to blink on and off.

11. The majority of respondents do not use task lighting, as indicated by the following responses:

Do use task lighting	33%
Don't use task lighting	65%
No response	2%

Section 3: Heating/Cooling

Air Temperature

1. Warm air from ventilation registers is the primary heat source (79% of responses), especially in administrative buildings. Some maintenance areas use overhead gas radiant heaters.

2. Chilled air from ventilation registers (central air) is the main cooling source (76% of responses), especially for administrative buildings. Fans were the next most popular response (9% of responses). Maintenance shops tended not to have a cooling option, other than to open shop and bay doors.

3. The following responses, on a 1 (Never) to 5 (Always) scale, indicate that in general respondents feel the air temperature in the summer is acceptable in the morning but gets hotter and less acceptable as the day progresses. In the winter, respondent satisfaction with air temperature relative to time of day is the reverse of the summer trend; respondents feel cold in the morning and more comfortable as the day progresses.

	1-2	3	4-5	N/A
Summer				
Morning	21%	37%	30%	12%
Midday	33%	32%	22%	13%
Afternoon	39%	28%	20%	13%
Evening	21%	22%	16%	44%
Winter				
Morning	40%	29%	27%	4%
Midday	32%	34%	30%	4%
Afternoon	28%	37%	31%	4%
Evening	20%	24%	20%	36%

4. In general, respondents can not regulate work area temperature (79% of responses). Those who do change the temperature do not switch it that often, either in the summer or winter, as indicated by the following results:

	Never or Once/Week	Once Daily	Several Times Daily
Summer	67%	21%	12%
Winter	64%	21%	15%

5. Respondents with windows in the work area were split regarding whether the sun had an impact on the comfort of their work areas, as indicated by the following results:

Yes, sun does have impact	33%
No, sun does not have impact	38%
Not applicable/no windows	29%

Explanations of the impact of the sun on the work area ranged from window areas being warmer to the afternoon sun heating up the work area. In some cases, the extra heat was seen as welcome.

6. In general, respondents do not use, or are not allowed to use, supplemental heat (88% of responses). In cases where supplementary heating was mentioned, electric space heaters were mentioned most frequently (94% of responses).

7. Respondents were split on the use of supplemental cooling, with fans being preferred. In maintenance areas, bay doors tend to be opened.

Yes, do use supplemental cooling	48%
No, do not use supplemental cooling	52%

Preferences for specific cooling sources include:

Fans	70% (168)
Windows	10% (23)
Both fans and windows	12% (28)
Bay doors	3% (8)
Fans and bay doors	Negl. (1)
Doors	5% (11)
Fans and doors	Negl. (1)

Humidity

1. Humidity generally is not viewed as negatively affecting work area comfort, as indicated by the following results. As expected, the results, on a scale of 1 (Never) to 5 (Always), do indicate less satisfaction with summer humidity compared to winter humidity:

	1-2	3	4-5	No Response
Summer	28%	41%	25%	6%
Winter	16%	47%	33%	4%

2. Respondents are not able to control humidity (96% of respondents); therefore, the response pool for questions 3 and 4 is small.

3. In the summer, fans are the most popular form of humidity control (47% of responses).

4. In the winter, respondents do not have a need to control humidity (83% of responses).

Ventilation

1. There were several complaints about ventilation in various buildings, but overall the responses, on a scale of 1 (Poor) to 5 (Excellent), were:

1 to 2	27%
3	40%
4 to 5	29%
No response	4%

In the maintenance areas, complaints tended to center on diesel, exhaust, and other fume sources (e.g., paints and solvents). In offices, there were complaints about lack of air movement (e.g., stuffy or stale air).

2. Many people interviewed in person complained that poor ventilation contributed to health problems. The following results show that the level of complaints is significant but does not represent the majority of respondents:

Does air quality contribute to:

	Yes	No	No Response
Colds	37%	61%	2%
Headaches	39%	59%	2%
Increased allergic reactions	36%	62%	2%
Other health problems	10%	88%	2%

A variety of respiratory problems was cited under "Other health problems."

3. Airborne dust tends not to be a problem.

Is a problem	26%
Is not a problem	71%
No response	3%

4. Settled dust tends not to be a problem.

Is a problem	31%
Is not a problem	66%
No response	3%

5. Respondents rate air circulation as fair to poor. Results, on a scale of 1 (Poor) to 5 (Excellent), follow:

1 to 2	32%
3	42%
4 to 5	23%
No response	3%

6. Respondents are not able to control work area air quality (86% of respondents).

7. Respondents would like to control work area air quality, as indicated by the following results, on a scale of 1 (Not important) to 5 (Very important):

1 to 2	8%
3	34%
4 to 5	55%
No response	3%

Section 4: Noise

1. The following results, on a scale of 1 (Not at all) to 5 (Very much), indicate that respondents do not tend to notice or be bothered by heating/ventilation/air conditioner system noise, fluorescent lighting buzz, or other work area noise. These results vary from building to building and between administrative and maintenance buildings. Office equipment noise, maintenance area noise, and people noise were mentioned most often as distracting:

	1	2-3	4-5	No Response
HVAC system noise	77%	15%	6%	2%
Fluorescent lighting buzz	83%	13%	1%	2%
Other work area noise	54%	28%	16%	2%

2. In general, respondents figure that they can not do anything about work area noise. In maintenance areas, ear plugs or ear muffs are worn. In some office areas, office doors or conference doors can be closed.

Section 5: Energy Awareness

1. A majority of respondents were aware of the Fort Hood Energy Awareness Program.

Are aware	59%
Are not aware	40%
No response	1%

2. A majority of respondents had heard of the term "peak demand."

Are aware	62%
Are not aware	37%
No response	1%

Those respondents who have heard of peak demand do seem to know its relation to the Fort Hood energy bill (84% of respondents).

3. Respondents tend not to know who their ECO is (78% of respondents).

4. Many respondents do not know if any energy conservation measures have been implemented in their building:

Do know	26%
Do not know	73%
No response	1%

The respondents who do know that energy conservation measures are being or have been implemented in their building indicate that the change either does not affect them (59% of responses) or affects them positively (33% of responses).

5. When not in continuous use, lights and appliances in and around the work area are not necessarily turned off, as indicated by the following responses on a 1 (Never) to 5 (Always) scale:

1 to 2	29%
3	37%
4 to 5	32%
No response	2%

6. Incentives (e.g., money) to save energy in the building would not necessarily promote energy conservation behavior:

Would promote energy conservation behavior	56%
Would not promote energy conservation behavior	42%
No response	2%

7. Some respondents did have ideas to conserve energy in the building/work area (36% of respondents).

8. In general, respondents did not have a negative impression of the term "energy conservation," as indicated by the following results:

Saves you, and the Army, money	54%
All of the above	24%
A way to lessen the impact on the environment	15%
Too hot in the summer, too cold in the winter	2%
None of the above	4%
No response	1%

APPENDIX A

IN-PERSON FORT HOOD BUILDING OCCUPANT SURVEY

FORT HOOD BUILDING OCCUPANT SURVEY: IN-PERSON INTERVIEW FORM

NOTE TO INTERVIEWER: For questions marked with a "*," we complete the question based on our observation. Introduce yourself and say there are some questions you are going to complete based on your observation. In the course of normal opening conversation, tell the interviewee how you are completing the questions, giving him/her a chance to correct you as necessary. If not interviewing in the person's work area, ask the question directly.

*Unit: _____ *Building/Unit POC _____

*Building Number: _____ *Floor Number: _____ *Room Number/Section: _____

*Date Survey Completed: _____

During this interview, I will be asking you questions about your work area. Your "work area" is the area where you perform the majority of your work, for instance, your office/room, workbench, highbay area, etc.

SECTION 1: GENERAL QUESTIONS

*1. What is the principal use of the building?

1 Office environment
2 Non-office environment (e.g., shops, special weapons, etc.)

*2. Where is your work area located?

1 Interior space in the building
2 Next to an outside wall with windows
3 Next to an outside wall without windows

If you circled #2, please circle the direction(s) the windows face: North, South, East, West

*3. What is the approximate floor area of the work area? **[Estimate, because some of the floor plans are difficult to interpret.]**

____ Square feet
____ Don't know

*4. If you are in an area with windows to the outside, what type of windows do you have?

1 Single pane
2 Single pane with storm windows
3 Double pane
4 None of the above
5 Don't know
6 Not applicable (No windows to the outside)

*5. What color are the walls? _____

*6. What color is the ceiling? _____

*7. What type of flooring or floor covering does your work area have?

1 Hard surface (hardwood, vinyl tile, concrete)
2 Soft surface (carpet)
3 Other (please specify) _____

SECTION 2: LIGHTING

Please circle the appropriate responses.

1. On a scale of 1 (Never Prefer) to 5 (Always Prefer), What are your preferences for **[name lighting source]** when performing your job/duties?

	Never Prefer		Sometimes Prefer		Always Prefer
Artificial light	1	2	3	4	5
Natural light	1	2	3	4	5

NOTE TO INTERVIEWER: If natural lighting is not available in interviewee work area, skip to Question #4.

*2. Are blinds, or other window shading devices, available to properly regulate the brightness of natural lighting?

1 Yes
2 No

3. Do you supplement natural lighting with artificial lighting?

1 Yes
2 No

If "Yes," why? For example...(Please circle those that apply.)

1 The natural lighting is not adequate
2 Artificial lighting reduces the glare or reflection on the computer screen
3 Feel more comfortable with additional artificial light
4 Other (please specify)_____

4. How many hours during the **[name weekday or weekend]** do you use artificial lighting in your work area? **(Ask interviewee to specify approximate hours so that spaces provided can be filled.)**

Weekdays:

____ Morning ____ Afternoon ____ Evening

Weekends:

____ Morning ____ Afternoon ____ Evening

5. Can you control the brightness of the artificial lighting?

1 Yes
2 No

If "Yes," please indicate how you control the brightness of the artificial lighting.

1 Dimmer control
2 Other (please specify)_____

NOTE TO INTERVIEWER: If interviewee answer to Question #5 was "No," skip to Question #8. Otherwise, continue with Question #6.

6. On a scale of 1 (Never) to 5 (Often), How frequently do you use the lighting control?

Never		Sometimes		Often
1	2	3	4	5

7. What lighting conditions would cause you to use the lighting control? For example...(Circle those that apply.)

1 Light too bright
2 Not enough light
3 Glare
4 Light uneven/shadows
5 Other (please specify)_____
6 No response. Feel no need for lighting control.

*8. What type of overhead/fixed artificial light do you have in your work area?

1 Fluorescent
2 Incandescent
3 Other (please specify) _____
4 Don't know

9. On a scale of 1 (Never) to 5 (Always), Are you satisfied with the quality of the **[state type of lighting observed]** lighting in your work area?

Never		Sometimes		Always
1	2	3	4	5

10. An automatic on-off lighting control (occupancy sensor) turns the lighting off when people are not in an area. On a scale of 1 (Against) to 5 (For), What are your preferences regarding the usefulness of occupancy sensors in **[name building area]**? You may answer "Not applicable" (N/A).

	Against		Neutral		For	N/A
Bathrooms	1	2	3	4	5	6
Office workspaces	1	2	3	4	5	6
Conference rooms	1	2	3	4	5	6
Recreation areas	1	2	3	4	5	6
Break areas	1	2	3	4	5	6

11. Do you supplement the overhead/fixed lighting with task lighting (For instance, a desk lamp or other light source that illuminates the immediate task on hand, rather than the entire work area)?

1 Yes
2 No

SECTION 3: HEATING/COOLING

Please circle the appropriate responses.

Air Temperature

*1. What is your primary heating source?

1 Warm air from ventilation registers
2 Radiator or baseboard heat
3 Spot heating (radiant or space heating infrared lamps)
4 Other (please specify) _____
5 Don't know

*2. What is your primary cooling source?

1 Chilled air from ventilation registers (central air)
2 Room air conditioners
3 Fans
4 Windows
5 Other (please specify) _____
6 Don't know

3. On a scale of 1 (Never) to 5 (Always), How often are you satisfied with the temperature in your work area in the **[name season]**? **(If interviewee does not work in this building during one of these seasons or does not work in the building during one of the time periods (i.e., evening) listed, circle N/A.)**

	Never		Usually		Always	N/A
Summer						
Morning	1	2	3	4	5	6
Midday	1	2	3	4	5	6
Afternoon	1	2	3	4	5	6
Evening	1	2	3	4	5	6
Winter						
Morning	1	2	3	4	5	6
Midday	1	2	3	4	5	6
Afternoon	1	2	3	4	5	6
Evening	1	2	3	4	5	6

4. Can you regulate the temperature in your work area?

1 Yes
2 No

If "Yes," how frequently do you find it necessary to readjust the temperature in the **[name season]**? Never? Once a week? Once daily? Several times a day?

	Never	Once a week	Once daily	Several times a day
Summer	1	2	3	4
Winter	1	2	3	4

5. Does the sun have any impact on the comfort level of your work area?

1 Not Applicable (No window)
2 Yes
3 No

If "Yes," please explain the impact (e.g., sun makes work area too hot or work area would be too cold without solar heat).

_____
_____

6. Do you use a supplemental heating source to adjust the comfort level in your work area (e.g., space heater)?

1 Yes
2 No

If "Yes," what do you use? **[read options]**

1 Electric space heater
2 Kerosene space heater
3 Other (please specify)_____

7. Do you use any supplemental cooling sources to adjust the comfort level in your work area (e.g., fans, windows, etc.)?

1 Yes
2 No

If "Yes," what do you use? **[read options]**

1 Fans
2 Windows
3 Both fans and windows
4 Other (please specify)_____

Humidity

1. On a scale of 1 (Never) to 5 (Always), How often do you feel comfortable with the humidity level in the **[name season]**?

	Never		Usually		Always
Summer	1	2	3	4	5
Winter	1	2	3	4	5

2. Can you regulate the humidity in your work area?

1 Yes
2 No

NOTE TO INTERVIEWER: If interviewee answer to Question #2 was "No," skip to Ventilation questions. Otherwise, continue with Question #3.

3. What action(s) do you take, if any, to adjust the humidity to a level that is comfortable during summer?

1 Humidity level is acceptable; no humidity control needed
2 Use a fan
3 Decrease air conditioner temperature setting
4 Open the window to generate an air draft

4. What action(s) do you take, if any, to adjust the humidity to a level that is comfortable during winter.

1 Humidity level is acceptable; no humidity control needed
2 Use a humidifier to add moisture to the air

Ventilation

1. On a scale of 1 (Poor) to 5 (Excellent), How would you describe the air quality in your work area?

Poor		Fair		Excellent
1	2	3	4	5

If "Poor," please explain.

_____
_____
_____

2. Do you think air quality has contributed in any way to:

Yes	No	
1	2	Colds?
1	2	Headaches?
1	2	Increased allergic reactions?
1	2	Other health problems? (please specify)_____

3. Is airborne dust a problem in your work area?

   1 Yes
   2 No

4. Is settled dust a problem in your work area?

   1 Yes
   2 No

5. On a scale of 1 (Poor) to 5 (Excellent), How would you describe the air circulation in your work area?

Poor		Fair		Excellent
1	2	3	4	5

6. Are you able to control the air quality in your work area?

   1 Yes
   2 No

   If "Yes," how?_____

7. On a scale of 1 (Not Important) to 5 (Very Important), How important is it to you to be able to control the air quality in your work area?

Not Important		Neutral		Very Important
1	2	3	4	5

SECTION 4: NOISE

Please circle the appropriate responses.

1. On a scale of 1 (Not at all) to 5 (Very much), To what extent does noise from **[Name source]** in or around your work area interfere with your work activities?

	Not at all		Somewhat		Very much
Heating/ventilation system and/or air conditioner noise	1	2	3	4	5
Fluorescent lighting buzz	1	2	3	4	5
Other noise in my work area	1	2	3	4	5

   Please describe noise source _____

2. Please describe what, if anything, you do to reduce noise that affects your work area.

   _____
   _____
   _____

SECTION 5: ENERGY AWARENESS

Please circle the appropriate responses.

1. Do you know about the Fort Hood Energy Awareness Program?

   1 Yes
   2 No

2. Have you heard of the term "peak demand?"

   1 Yes
   2 No

   If "Yes," Do you understand the relationship between energy use during peak demand periods and Fort Hood's energy bills?

   1 Yes
   2 No

2. Do you know if you have an Energy Conservation Officer (ECO) or Building Energy Monitor (BEM) assigned to your unit or office?

   1 Yes
   2 No

   If "Yes," who is your ECO or BEM? _____

3. Do you know of any steps that have been taken to save energy in your building?

   1 Yes
   2 No

   If "Yes," how do you think the change affected your work area quality and comfort?

   1 Positively
   2 Negatively
   3 No change noticed

   If "Positively" or "Negatively," please explain.

   _____
   _____
   _____

4. On a scale of 1 (Never) to 5 (Always), In your work area and surrounding work areas, are lights and appliances consistently turned off when they are not in continuous use?

Never		Usually		Always
1	2	3	4	5

5. If any incentives (e.g., money, etc.) were offered to save energy in the building, would you alter your current behavior or work patterns?

   1 Yes
   2 No

6. Do you have any suggestions for saving energy in your building?

   1 Yes
   2 No

   If "Yes," please describe.

   _____
   _____
   _____

7. What does the term "energy conservation" mean to you? (Please circle **only ONE** answer)

   1 Too hot in the summer, too cold in the winter
   2 Saves you, and the Army, money
   3 A way to lessen the impact on the environment
   4 All of the above
   5 None of the above

   If "None of the above," please define what it means to you.

   _____
   _____
   _____

ABOUT YOURSELF

The following information will help us to understand how different types of people feel about their work area.

Your Job Title:_____ Your Grade/Rank:_____

How long have you worked in your present work area? _____years _____months

How long have you worked in your present building? _____years _____months

How many hours are you scheduled to work per day? _____hours

On a scale of 1 (Never) to 5 (Always), How frequently do you work more hours than scheduled?

Never		Sometimes		Always
1	2	3	4	5

Observe/note interviewee sex. _____Male _____Female What is your age?_____years

THANK YOU FOR YOUR HELP!!

We would welcome any comments that you might have about this survey or about where you work.

NOTE TO INTERVIEWER: Indicate approximately how long it took to complete the survey.

_____minutes

NOTE TO INTERVIEWER: Ask interviewee if he/she found that the number of choices for the survey questions were:

____Too few
____OK
____Too many

NOTE TO INTERVIEWER: ASK FOR ANY ADDITIONAL COMMENTS ABOUT INTERVIEWEE'S WORK AREA AND WRITE IN THE SPACE BELOW.

APPENDIX B

SELF-ADMINISTERED FORT HOOD BUILDING OCCUPANT SURVEY

Building/Unit POC _____

FORT HOOD BUILDING OCCUPANT SURVEY

Unit: _____

Building Number: _____ Floor Number: _____ Room Number/Section: _____

Date Survey Completed: _____

NOTE: The term "work area" is defined as the area where you perform the majority of your work, e.g., your office/room, workbench, highbay area, etc.

SECTION 1: GENERAL QUESTIONS

Please circle the appropriate responses.

1. What is the principal use of the building?

   1 Office environment
   2 Non-office environment (e.g., shops, special weapons, etc.)

2. Where is your work area located?

   1 Interior space in the building
   2 Next to an outside wall with windows
   3 Next to an outside wall without windows

   If you circled #2, please circle the direction(s) the windows face: North, South, East, West

3. What is the approximate floor area of the work area?

   ____ Square feet
   ____ Don't know

4. If you are in an area with windows to the outside, what type of windows do you have?

   1 Single pane
   2 Single pane with storm windows
   3 Double pane
   4 None of the above
   5 Don't know
   6 Not applicable (No windows to the outside)

5. What color are the walls? _____

6. What color is the ceiling? _____

7. What type of flooring or floor covering does your work area have?

1 Hard surface (hardwood, vinyl tile, concrete)
2 Soft surface (carpet)
3 Other (please specify) _____

SECTION 2: LIGHTING

Please circle the appropriate responses.

1. What are your preferences for artificial or natural lighting when performing your job/duties?

	Never Prefer		Sometimes Prefer		Always Prefer
Artificial light	1	2	3	4	5
Natural light	1	2	3	4	5

NOTE: **If natural lighting is not available in your work area, please skip to Question #4.**

2. Are blinds, or other window shading devices, available to properly regulate the brightness of natural lighting?

1 Yes
2 No

3. Do you supplement natural lighting with artificial lighting?

1 Yes
2 No

If "Yes," why? (Please circle those that apply.)

1 The natural lighting is not adequate
2 Artificial lighting reduces the glare or reflection on the computer screen
3 Feel more comfortable with additional artificial light
4 Other (please specify)_____

4. How many hours during the day do you use artificial lighting in your work area? (Please specify approximate hours in the spaces provided.)

Weekdays:

____ Morning ____ Afternoon ____ Evening

Weekends:

____ Morning ____ Afternoon ____ Evening

5. Can you control the brightness of the artificial lighting?

1 Yes
2 No

If "Yes," please indicate how you control the brightness of the artificial lighting.

1 Dimmer control
2 Other (please specify)_____

NOTE: If your answer to Question #5 was "No," please skip to Question #8. Otherwise, please continue with Question #6.

6. How frequently do you use the lighting control?

Never		Sometimes		Often
1	2	3	4	5

7. Which of the following lighting conditions would cause you to use the lighting control? (Please circle those that apply.)

1 Light too bright
2 Not enough light
3 Glare
4 Light uneven/shadows
5 Other (please specify)_____
6 No response. Feel no need for lighting control.

8. What type of overhead/fixed artificial light do you have in your work area?

1 Fluorescent
2 Incandescent
3 Other (please specify) _____
4 Don't know

9. Are you satisfied with the quality of the artificial lighting in your work area?

Never		Sometimes		Always
1	2	3	4	5

10. An automatic on-off lighting control (occupancy sensor) turns the lighting off when people are not in an area. What are your preferences regarding areas in your building where occupancy sensors would be useful?

	Against		Neutral		For	N/A
Bathrooms	1	2	3	4	5	6
Office workspaces	1	2	3	4	5	6
Conference rooms	1	2	3	4	5	6
Recreation areas	1	2	3	4	5	6
Break areas	1	2	3	4	5	6

11. Do you supplement the overhead/fixed lighting with task lighting (e.g., a desk lamp or other light source that illuminates the immediate task on hand, rather than the entire work area)?

1 Yes
2 No

SECTION 3: HEATING/COOLING

Please circle the appropriate responses.

Air Temperature

1. What is your primary heating source?

1 Warm air from ventilation registers
2 Radiator or baseboard heat
3 Spot heating (radiant or space heating infrared lamps)
4 Other (please specify) _____
5 Don't know

2. What is your primary cooling source?

1 Chilled air from ventilation registers (central air)
2 Room air conditioners
3 Fans
4 Windows
5 Other (please specify) _____
6 Don't know

3. How often are you satisfied with the temperature in your work area, during the following seasons? (If you have not worked in this building during one of these seasons or do not work in the building during one of the time periods (i.e., evening) listed, please circle N/A.)

	Never		Usually		Always	N/A
Summer						
Morning	1	2	3	4	5	6
Midday	1	2	3	4	5	6
Afternoon	1	2	3	4	5	6
Evening	1	2	3	4	5	6
Winter						
Morning	1	2	3	4	5	6
Midday	1	2	3	4	5	6
Afternoon	1	2	3	4	5	6
Evening	1	2	3	4	5	6

4. Can you regulate the temperature in your work area?

1 Yes
2 No

If "Yes," please indicate how frequently you find it necessary to readjust the temperature?

	Never	Once a week	Once daily	Several times a day
Summer	1	2	3	4
Winter	1	2	3	4

5. Does the sun have any impact on the comfort level of your work area?

1 Not Applicable (No window)
2 Yes
3 No

If "Yes," please explain the impact (e.g., sun makes work area too hot or work area would be too cold without solar heat).

_____

_____

6. Do you use a supplemental heating source to adjust the comfort level in your work area (e.g., space heater)?

1 Yes
2 No

If "Yes," what do you use?

1 Electric space heater
2 Kerosene space heater
3 Other (please specify)_____

7. Do you use any supplemental cooling sources to adjust the comfort level in your work area (e.g., fans, windows, etc.)?

1 Yes
2 No

If "Yes," what do you use?

1 Fans
2 Windows
3 Both fans and windows
4 Other (please specify)_____

Humidity

1. How often do you feel comfortable with the humidity level?

	Never		Usually		Always
Summer	1	2	3	4	5
Winter	1	2	3	4	5

2. Can you regulate the humidity in your work area?

1 Yes
2 No

NOTE: If your answer to Question #2 was "No," please skip to Ventilation questions. Otherwise, please continue with Question #3.

3. Please circle the action(s) you take, if any, to adjust the humidity to a level that is comfortable during summer.

1 Humidity level is acceptable; no humidity control needed
2 Use a fan
3 Decrease air conditioner temperature setting
4 Open the window to generate an air draft

4. Please circle the action(s) you take, if any, to adjust the humidity to a level that is comfortable during winter.

1 Humidity level is acceptable; no humidity control needed
2 Use a humidifier to add moisture to the air

Ventilation

1. How would you describe the air quality in your work area?

Poor		Fair		Excellent
1	2	3	4	5

If "Poor," please explain.

_____
_____
_____

2. Do you think air quality has contributed in any way to the following health problems?

Yes	No	
1	2	Colds
1	2	Headaches
1	2	Increased allergic reactions
1	2	Other (please specify) _____

3. Is airborne dust a problem in your work area?

   1 Yes
   2 No

4. Is settled dust a problem in your work area?

   1 Yes
   2 No

5. How would you describe the air circulation in your work area?

Poor		Fair		Excellent
1	2	3	4	5

6. Are you able to control the air quality in your work area?

   1 Yes
   2 No

   If "Yes," how?_____

7. How important is it to you to be able to control the air quality in your work area?

Not Important		Neutral		Very Important
1	2	3	4	5

SECTION 4: NOISE

Please circle the appropriate responses.

1. To what extent does noise from the following sources in or around your work area interfere with your work activities?

	Not at all		Somewhat		Very much
Heating/ventilation system and/or air conditioner noise	1	2	3	4	5
Fluorescent lighting buzz	1	2	3	4	5
Other noise in my work area	1	2	3	4	5

   Please describe noise source _____

2. Please describe what, if anything, you do to reduce noise that affects your work area.

   _____
   _____
   _____

SECTION 5: ENERGY AWARENESS

Please circle the appropriate responses.

1. Do you know about the Fort Hood Energy Awareness Program?

   1 Yes
   2 No

2. Have you heard of the term "peak demand?"

   1 Yes
   2 No

   If "Yes," Do you understand the relationship between energy use during peak demand periods and Fort Hood's energy bills?

   1 Yes
   2 No

2. Do you know if you have an Energy Conservation Officer (ECO) or Building Energy Monitor (BEM) assigned to your unit or office?

   1 Yes
   2 No

   If "Yes," who is your ECO or BEM? _____

3. Do you know of any steps that have been taken to save energy in your building?

   1 Yes
   2 No

   If "Yes," how do you think the change affected your work area quality and comfort?

   1 Positively
   2 Negatively
   3 No change noticed

   If "Positively" or "Negatively," please explain.

   _____
   _____
   _____

4. In your work area and surrounding work areas, are lights and appliances consistently turned off when they are not in continuous use?

Never		Usually		Always
1	2	3	4	5

5. If any incentives (e.g., money, etc.) were offered to save energy in the building, would you alter your current behavior or work patterns?

   1 Yes
   2 No

6. Do you have any suggestions for saving energy in your building?

   1 Yes
   2 No

   If "Yes," please describe.

   _____
   _____
   _____

7. What does the term "energy conservation" mean to you? (Please circle **only ONE** answer)

   1 Too hot in the summer, too cold in the winter
   2 Saves you, and the Army, money
   3 A way to lessen the impact on the environment
   4 All of the above
   5 None of the above

   If "None of the above," please define what it means to you.

   _____
   _____
   _____

ABOUT YOURSELF

The following information will help us to understand how different types of people feel about their work area.

Your Job Title:_____ Your Grade/Rank:_____

How long have you worked in your present work area? _____years _____months

How long have you worked in your present building? _____years _____months

How many hours are you scheduled to work per day? _____hours

How frequently do you work more hours than scheduled?

Never		Sometimes		Always
1	2	3	4	5

What is your sex? _____Male _____Female What is your age? _____years

THANK YOU FOR YOUR HELP!!

We would welcome any comments that you might have about this survey or about where you work.

If you know *approximately* how long it took you to complete this survey, please tell us.

_____minutes

Did you find that the number of choices for the survey questions were:

____Too few
____OK
____Too many

Were there questions that you did not understand?

____Yes
____No

If "Yes," please help us by going back to them and circling them. Any comments that you have about the questions would be appreciated greatly.

PLEASE FEEL FREE TO WRITE ANY ADDITIONAL COMMENTS ABOUT YOUR WORK AREA IN THE SPACE BELOW.

PLEASE RETURN SURVEY TO THE BUILDING OR UNIT POC BY FRIDAY, MARCH 12. OTHERWISE, MAIL USING THE SELF-ADDRESSED, STAMPED ENVELOPE.

APPENDIX C

DATABASE AND ANALYTICAL FILES

EXHIBIT C.1: LIST OF R-BASE FILES CONTAINING DATABASE OF SURVEY FORMS

File Name	Description of Output File Contents
CERL1.RBF	R-Base Database Containing Survey Records
CERL2.RBF	R-Base Database Containing Survey Records
CERL3.RBF	R-Base Database Containing Survey Records

EXHIBIT C.2: FILES CONTAINING RESPONSES TO ALL SURVEY QUESTIONS FOR ALL RESPONDENTS, BY BUILDING

File Name	Description of Output File Contents
ALL.OUT	All Respondents/All Buildings
1001.OUT	All Respondents/Building 1001 (III Corps HQ)
28000.OUT	All Respondents/Building 28000 (1CD Division HQ)
410.OUT	All Respondents/Building 410 (2AD Division HQ)
91012.OUT	All Respondents/Building 91012 (TEXCOM HQ)
39009.OUT	All Respondents/Building 39009 (13th COSCOM HQ)
108.OUT	All Respondents/Building 108 (DEH Housing)
23020.OUT	All Respondents/Building 23020 (PMO Building)
4213.OUT	All Respondents/Building 4213 (DEH Admin)
4227.OUT	All Respondents/Building 4227 (DEH EP&S Administration)
33010.OUT	All Respondents/Building 33010 (Training Facility)
88036.OUT	All Respondents/Building 88036 (DOL Vehicle Maintenance Shop)
40001.OUT	All Respondents/Building 40001 (DOL Vehicle Maintenance Shop)
32023.OUT	All Respondents/Building 32023 (1CD Vehicle Maintenance Shop)
9553.OUT	All Respondents/Building 9553 (6th Cavalry Vehicle Maintenance Shop)
30009.OUT	All Respondents/Building 30009 (HHC 1/8 CAV 1CD Maintenance Shop)

Note: File Name 30009.OUT covers self-administered surveys labeled with the Building 30015 POC name but covering results for Building 30009. Ten of the respondents returning self-administered surveys indicated Building 30009 on the survey form, as explained in Note 6 in Exhibit 1.2. No in-person survey interviews were conducted.

EXHIBIT C.3: FILES CONTAINING RESPONSES TO SELECTED SURVEY QUESTIONS FOR ALL RESPONDENTS WITH WINDOWS IN THE WORK AREA, BY BUILDING

File Name	Description of Output File Contents
WINYES.OUT	All Respondents with Windows in Work Area/Each Building
WINYESF.OUT	Female Respondents with Windows in Work Area/Each Building
WINYESM.OUT	Male Respondents with Windows in Work Area/Each Building

EXHIBIT C.4: FILES CONTAINING RESPONSES TO SELECTED SURVEY QUESTIONS FOR ALL RESPONDENTS WITHOUT WINDOWS IN THE WORK AREA, BY BUILDING

File Name	Description of Output File Contents
WINNO.OUT	All Respondents without Windows in Work Area/Each Building
WINNOF.OUT	Female Respondents without Windows in Work Area/Each Building
WINNOM.OUT	Male Respondents without Windows in Work Area/Each Building

EXHIBIT C.5: FILES CONTAINING RESPONSES TO SELECTED NON-WINDOW DEPENDENT SURVEY QUESTIONS FOR MALE AND FEMALE RESPONDENTS, BY BUILDING

File Name	Description of Output File Contents
FEMALE.OUT	Female Respondents/Each Building
MALE.OUT	Male Respondents/Each Building

EXHIBIT C.6: OTHER FILES

File Name	Description of Output File Contents
AGE.OUT	Age Distribution of Respondents/Across All Buildings