Final Submittal

Energy Engineering Analysis Program
Lighting Survey of Selected Buildings
Pine Bluff Arsenal

Pine Bluff, Arkansas

Volume I
Narrative Report

Contract No. DACA01-94-D-0038
Delivery Order No. 0001

June 1995

DEPARTMENT OF THE ARMY
CONSTRUCTION ENGINEERING RESEARCH LABORATORIES, CORPS OF ENGINEERS
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FINAL SUBMITTAL

ENERGY ENGINEERING ANALYSIS PROGRAM

LIGHTING SURVEY OF SELECTED BUILDINGS

PINE BLUFF ARSENAL

PINE BLUFF, ARKANSAS

VOLUME I

NARRATIVE REPORT

CONTRACT NO. DACA01-94-D-0038
DELIVERY ORDER NO. 0001

PREPARED FOR:

U.S. ARMY CORPS OF ENGINEERS
LITTLE ROCK, ARKANSAS

PREPARED BY:

REYNOLDS, SMITH AND HILLS, INC.
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P.O. BOX 4850
JACKSONVILLE, FLORIDA 32201

PROJECT NO. 6941331001

JUNE 1995

Carlos S. Warren, PhD, PE
Project Manager

1.0 INTRODUCTION

1.1 Authorization

The Energy Engineering Analysis Program (EEAP), Lighting Survey of Selected Buildings at Pine Bluff, Arsenal, was authorized by the U.S. Army, Little Rock District, Corps of Engineers, under Contract Number DACA01-94-D-0038. Delivery Order Number 0001, dated 29 September 1994.

1.2 Objectives

The objectives of this Delivery Order (D.O.), as shown in the Detailed Scope of Work (Appendix A, Volume II) are as follows:

A. Perform a site survey of 45 buildings selected by Arsenal personnel. The purpose of the site survey is to gather sufficient data to permit evaluation of possible Energy Conservation Opportunities (ECOs).

B. Evaluate possible and new ECOs.

C. Combine ECOs into recommended projects.

D. Prepare a comprehensive report to document the work performed, the results and the recommendations. The final report is to contain funds programming documentation.

1.3 Phases of Work

The work performed under the contract has been divided into three phases:

- Phase I--Field Investigation and Data Gathering.
- Phase II--Data Analysis. Analysis of data, identification of potential projects, performance of feasibility and economic studies and preparation of Life Cycle Cost Analysis forms. During this phase, all potential projects which produce energy and/or dollar savings will be identified and evaluated as to their technical and economical feasibility. Projects will be ranked according to the highest saving investment ratio (SIR) value.
- Phase III--Report Preparation. Complete documentation of work accomplished. Project documentation for all justifiable ECOs.

1.4 Submission Requirements

The study is divided into three submissions.

A. Interim Report
B. Oral Presentation
C. Final Report

1.5 Work Accomplished

An entrance meeting was held with the Corps of Engineers (COE) Project Manager and personnel from the Arsenal Engineering Plans and Services to discuss the scope of work, and work plans and schedules for the field survey.

The initial field survey of the Arsenal was performed from 15 November 1994 through 18 November 1994. During that time, a team of four engineers from Reynolds, Smith and Hills, Inc. (RS&H) performed tests, made observations and conducted interviews with installation personnel.

An additional field survey was conducted on 9 December 1994 through 11 December 1994.

The exit meeting was held with COE and Arsenal personnel after the December survey.

Since that time, work has been performed in the analysis and documentation phases of the project. This included ECO evaluation, Life Cycle Cost Analysis, and documentation of the results and site survey observations. The results of these efforts form the Interim Submittal.

1.6 Report Organization

The report consists of five volumes. Volume I, the Narrative Report, contains the results of all of the site surveys, analysis and project development. The Detailed Scope of Work, Prenegotiation Minutes and all backup data and calculations are found in Volume II. The site survey notes are in Volume III. Project documentation is contained in Volume IV. An Executive Summary volume is also included.

Volume I, the Narrative Report is organized as follows: Following a brief introduction in Section 1.0, the existing conditions at Pine Bluff Arsenal are discussed in Section 2.0. This includes a description of the installation, current and past energy use patterns. Section 3.0 describes the techniques used to perform this study. Section 4.0 contains the results of the analysis of the energy conserving opportunities (ECOs). The ECO Implementation Plan and the effects on energy use at the Arsenal are located in Section 5.0. Section 6.0 contains illuminance calculations for each building. Section 7.0 summarizes the proposed modifications for each building. Section 8.0 contains the review comments for the Interim Submittal and responses thereto.

2.0 EXISTING CONDITIONS

2.1 Installation Description

Pine Bluff Arsenal, located in Pine Bluff, Arkansas, is an installation of the Armament, Munitions and Chemical Command. The Arsenal is a government-owned, government-operated installation, with the primary function of loading and packing munitions.

2.2 Facilities Description

As reported in fiscal year 1994, the Arsenal had 537 buildings comprising approximately 2,397,000 square feet of floor space. The lighting survey was conducted over portions of 45 buildings, totaling 424,823 square feet, or approximately 18 percent of the Arsenal's floor space. The surveyed buildings are listed below:

Bldg #	Description	% Surveyed	Occupant	Surveyed Floor Space (SF)
10-020	Administration Building	Partial	MPCAO (Adj)	21,284
10-030	Administration General Purpose	Complete	Environ Mgt/ Sec	6,897
10-050	Fire Headquarters	Complete	FF&P Div	6,532
13-010	Community Services Bldg	Complete	HQ Det	2,429
13-020	US Army Health Clinic	Complete	MEDDAC	3,844
13-030	52nd EOD	Complete	52d EOD	3,007
13-040	BZ/Counseling Facility	Partial	MEDDAC	1,483
13-060	Clinic without beds	Complete	MEDDAC	2,835
13-080	Lab	Complete	MEDDAC/ DIR/OTS	4,620
13-100	Infirmary	Complete	MEDDAC	1,920
13-110	Audio Visual Facility	Complete	DOIM	1,974
16-210	Barracks	Hall/shower /restrooms	MPCAO	1,389
16-220	Barracks	Hall/shower /restrooms	Dir/OTS	1,389
31-010	Elec Calibration Lab/No Conversion	Complete	TMDE	332
31-080	Electronic Calibration Facility	Complete	TMDE	1,705
32-030	Inspection Garage	Complete	Mob Equip	5,435

32-035	Ordnance Shop	Complete	Mob Equip	17,640
32-060	Boiler & Compressor House	Complete	BGU&PS Div	4,853
32-070	Impreg & Laundry	Complete	Prop Mgt Div	18,217
32-090	General Purpose Warehouse	Complete	Mob Equip	7,140
32-100	Elec/Com Calibration Fac	Complete	Dir, PA	10,493
32-130	Ammo Qual Assur Fac	Complete	Envir/Nat Resr	3,049
32-150	Ammo Qual Assur Fac	Complete	Envir/Nat Resr	1,260
33-060	Boiler/Compressor	Complete	BGU&PS Div	4,853
33-530	Fill & Press	East/West ends (packout area only)	Prod Div	7,119
34-110	WP Filling	Complete	Prod Div	86,427
34-120	Ammo Quality Fac	South end only	Dir/PA	5,501
34-140	Boiler/Compressor	Complete	BGU&PS Div	2,037
34-910	Admin Gen Purpose/FE Maint Shop	Complete	BGU&PS Div	81,407
34-970	Admin Bldg Gen Purpose	Complete	DEH	1,915
44-100	Prod Fld Ofc Cplx	Complete	Prod Div	25,006
51-420	Office Bldg (DMMD)	Complete	DMMD	7,577
51-430	Engr Admin Bldg	Complete	LRDCE	1,679
53-160	Chemical Admin Bldg	Complete	Dir/E&T	3,917
60-020	Security Bldg (7 Days per week/24 hrs per day)	Complete	Sec Ofc	8,768
60-060	Admin Gen Purpose	Complete	DMMD	3,478
60-070	Fixed Laundry	Complete	DMMD	4,909
60-090	TC Admin Bldg	Complete	DOL	1,833
60-630	Warehouse	Complete	DMMD	8,833
63-100	Chemical Field Maint Shop	Complete	DMMD	7,858
63-110	Chemical Maint Shop	Complete	DMMD	10,040
63-120	Chemical Field Maint Shop	Complete	DMMD	11,349
63-200	Chemical Field Maint Shop	Complete	DMMD	11,804
63-210	Mask Repair	Complete	DMMD	11,352
63-410	Toxic/Conventional Change House	Complete	DMMD	8,034

2.3 Historical Energy Use and Costs

All historical energy use and cost data were gathered from the U.S. Army Data DEIS (Defense Energy Information System) system, or ADDS.

2.3.1 Energy Use. Total facility and production energy consumption at Pine Bluff Arsenal increased by approximately eight percent from FY 85 through FY 94 (Figure 2-1). The causes were due to increase of four percent in the use of thermal energy and electricity, which increased 43 percent over the same time period.

Monthly consumption of heating fuels and electricity for FY 94 is shown in Figure 2-2. The dependence of heating fuels on weather is apparent, although thermal energy is required during the summer months for production and other uses. Electricity use is fairly constant throughout the year, with slight increases occurring in the summer months due to air conditioning.

Percentages of fuel use for FY 94 are shown in Figure 2-3. The heating fuels accounted for approximately 86 percent of energy use in that year and electricity the remainder.

2.3.2 Costs. Total annual energy costs at Pine Bluff Arsenal, $3,085,671 in FY 94, have increased ten percent over the FY 85 values (Figure 2-4). Electricity shows the greatest increase, approximately 69 percent from FY 85 through FY 94. Unit prices for electricity showed an increase of 18 percent from FY 85 through FY 94 (Figure 2-5).

Figure 2-6 displays monthly energy costs at Pine Bluff Arsenal. As in the case of consumption, heating fuel costs vary widely, depending on weather. Electricity costs are a significant portion of the monthly costs, and can range from 35 percent of the monthly total to more than 60 percent. Electricity costs are a significant percentage of the total annual energy bill because of the higher unit price. In FY 94, electricity costs represented 74 percent of the total buildings expense of $1,650,000 (Figure 2-7).

2.3.3 Electric Rate Analysis. Electricity at Pine Bluff Arsenal is provided by Arkansas Power and Light to three substations--A, B and C. The rate analysis was done for charges from the A and B substation, since the buildings surveyed are served from those substations.

Pine Bluff Arsenal

Historical Energy Consumption

Source: ADDS

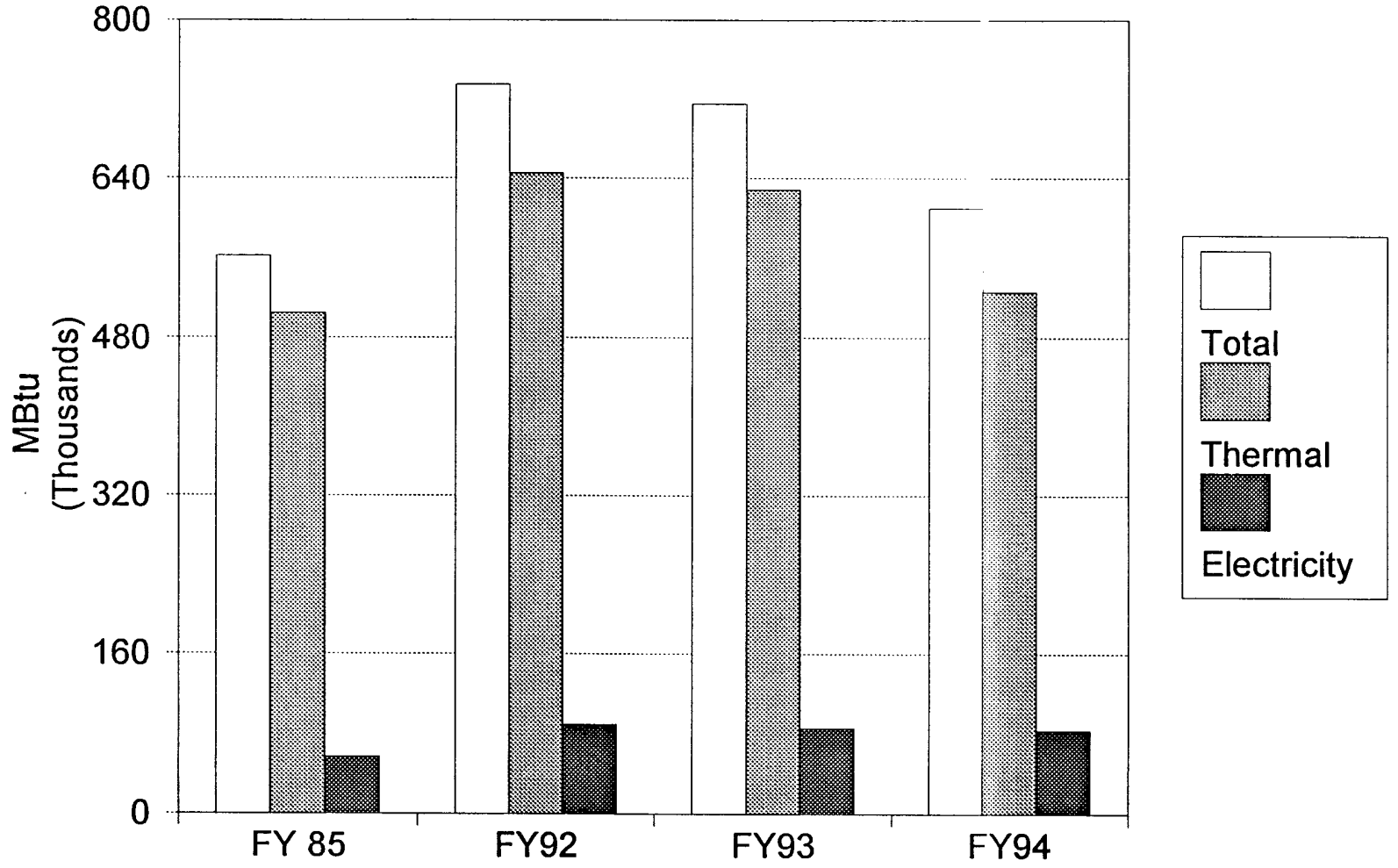

Figure 2-1

Pine Bluff Arsenal

Monthly Energy Consumption

Source: ADDS

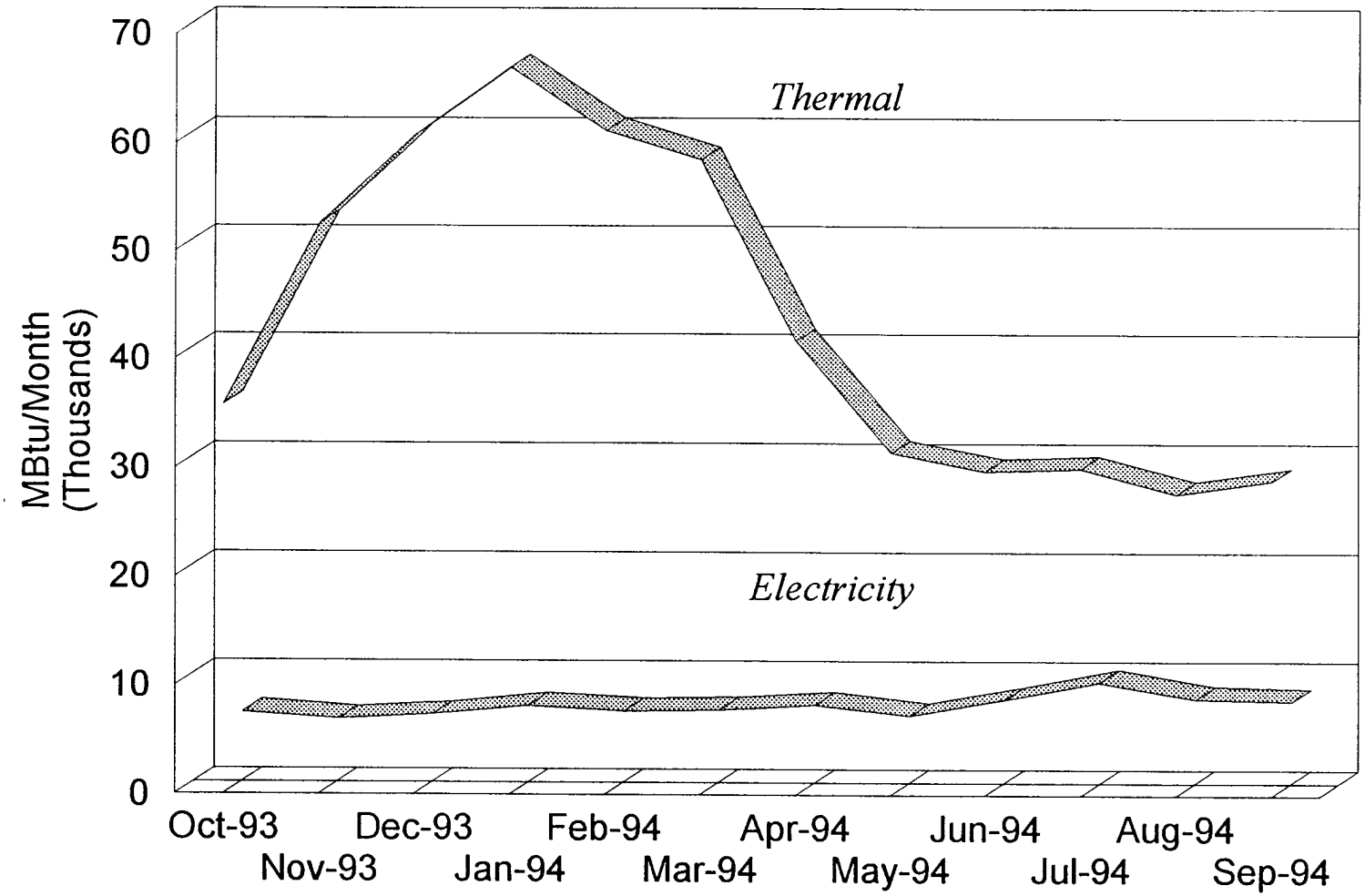

Figure 2-2

Pine Bluff Arsenal

FY 94 Buildings Energy Consumption

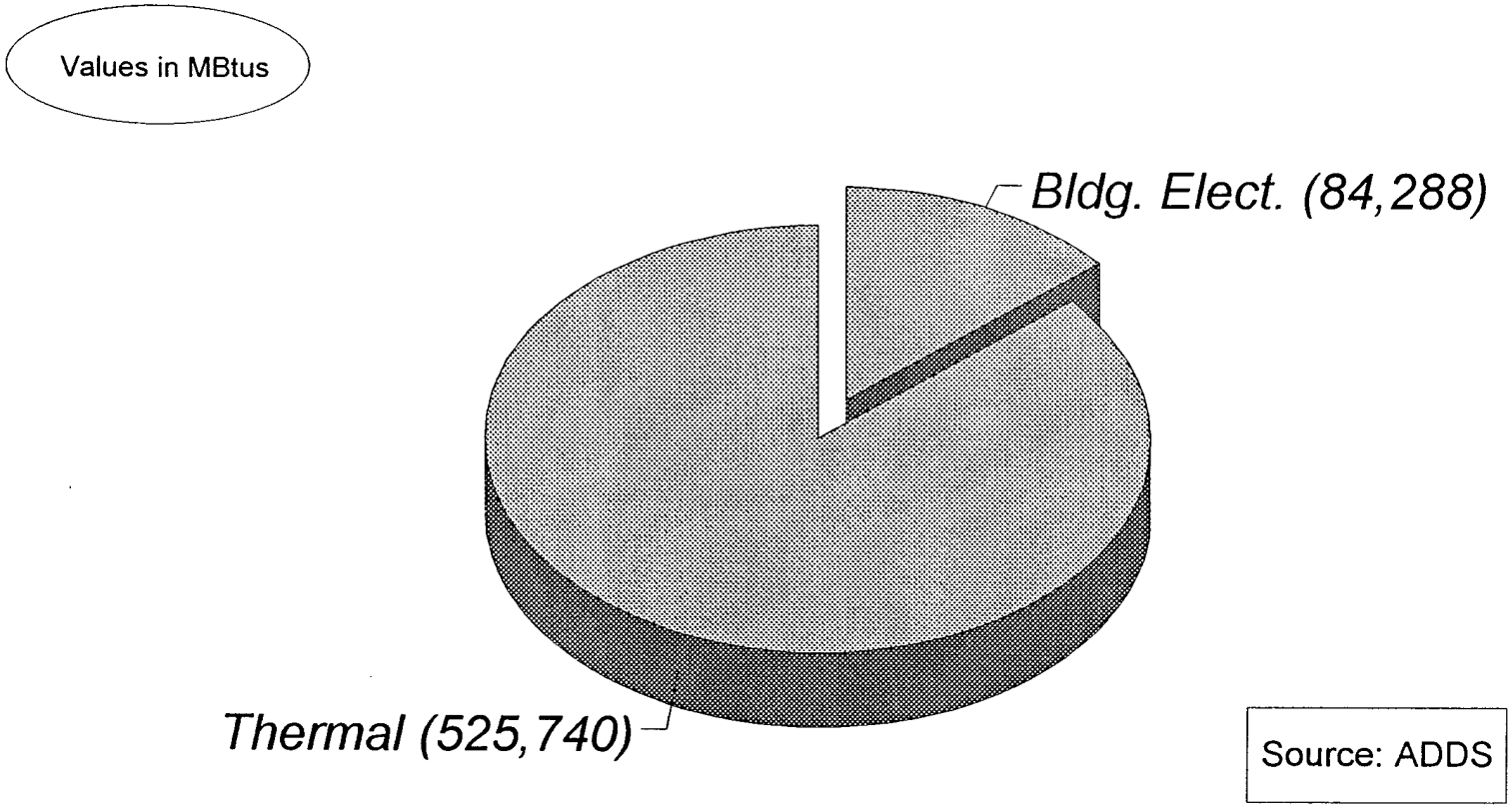

Figure 2-3

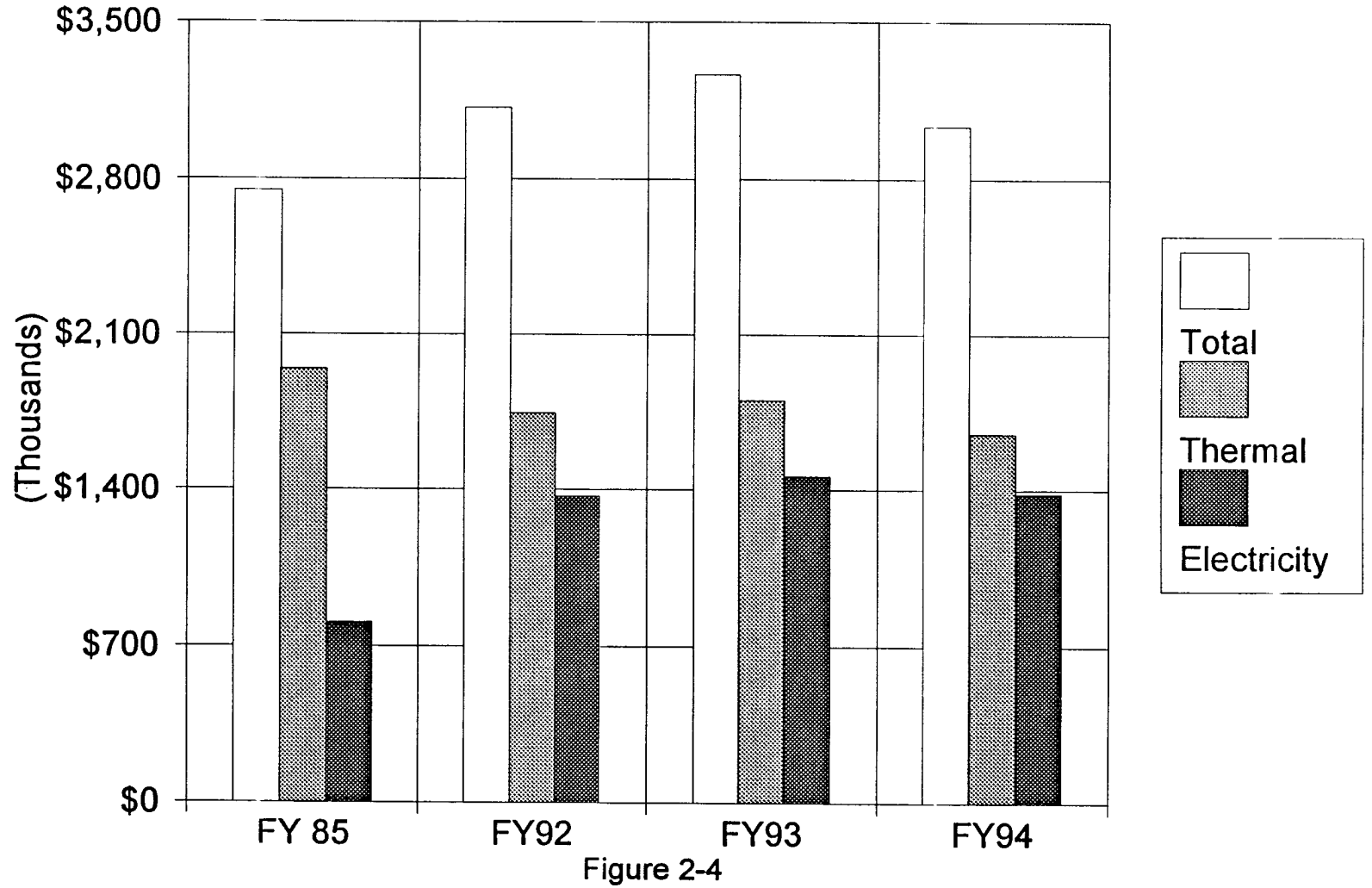
Pine Bluff Arsenal
Historical Energy Cost
Source: ADDS
$3,500
$2,800
$2,100
$1,400
$700
$0
(Thousands)
FY 85
FY92
FY93
FY94
Total
Thermal
Electricity

Figure 2-4

Pine Bluff Arsenal

Historical Energy Unit Costs

Source: ADDS

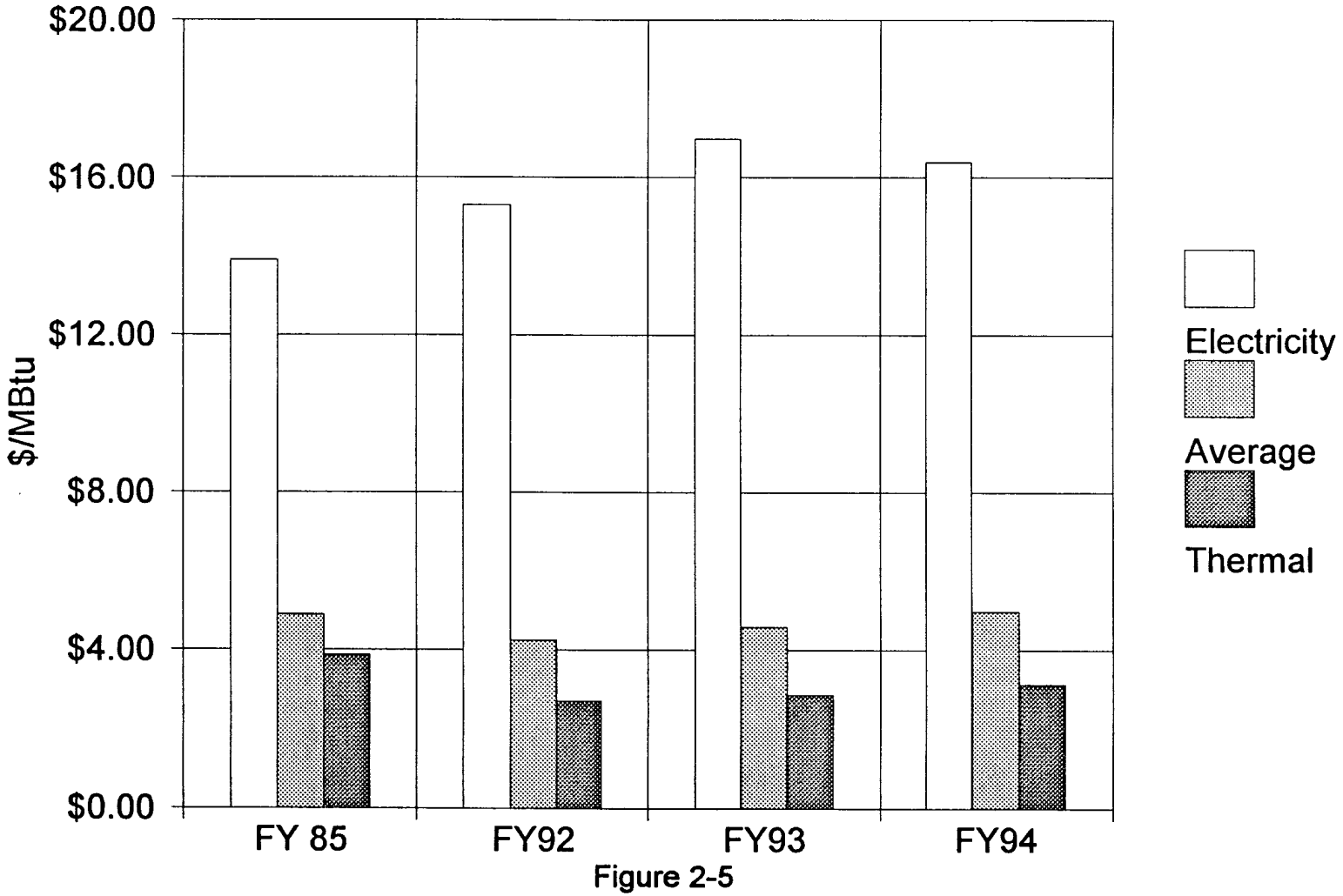

Figure 2-5

Pine Bluff Arsenal

Monthly Energy Costs

Source: ADDS

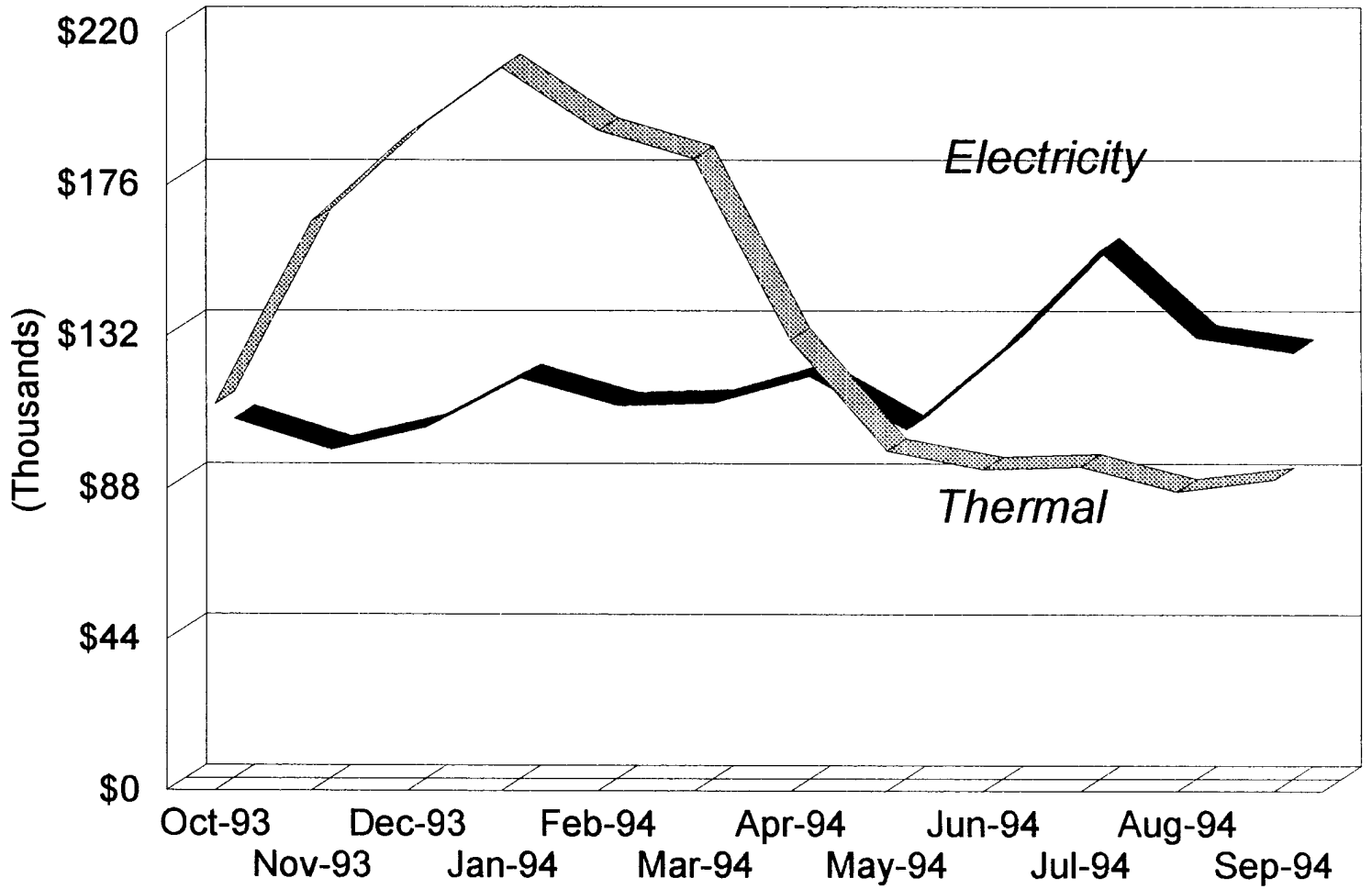

Figure 2-6

Pine Bluff Arsenal
FY 94 Buildings Energy Costs

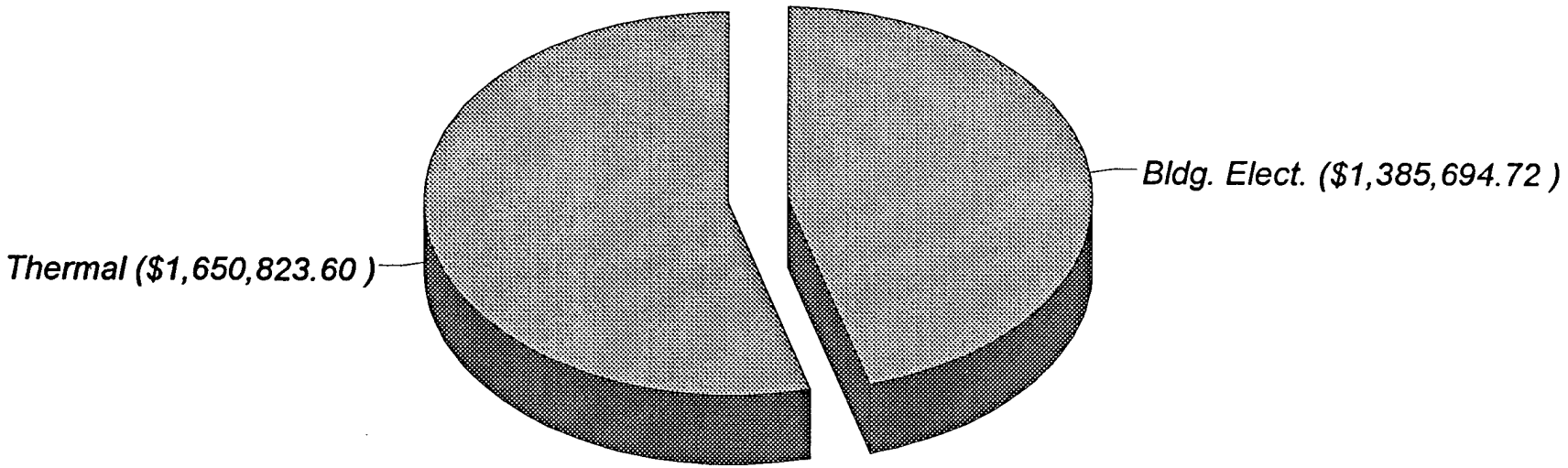

Figure 2-7

The bills have many categories of charges; for analysis purposes, the charges are included in either the demand or energy portions of the bill. Two rates are charged; a winter rate for the Months October - May, and a summer rate for June -September. Bills from January 1995 and August 1994 were analyzed with the following results:

	Summer	Winter	Annual Average
Demand	$14.13/kW	$12.58 kW	$13.36/kW
Energy	$0.0343/kWh	$0.0258/kWh	$0.0301/kWh
Average	$0.0846/kWh	$0.475/kWh	$0.0661/kWh

From the two bills analyzed, demand charges constituted 46 percent of the January 95 total amount, and 59 percent of the August 94 amount. The annual average rate was used to evaluate the ECOs in this report.

Details of the analysis are contained in Volume II.

3.0 METHODOLOGY

3.1 Data Collection

The first phase of this project was to collect information concerning the lighting fixtures in the 45 surveyed buildings and their use. Data collected included building lists and drawings. Energy data and prices were collected from Arsenal personnel, Arkansas Power and Light Company and the Army Data DEIS System.

3.2 Site Survey

The site survey effort was divided into two, two-person teams: three mechanical engineers and one electrical engineer comprised the four team members.

Each team was assigned buildings based on floor space, so that each team surveyed approximately the same amount of space. Room-by-room surveys were conducted in each of the 45 buildings, and data collected on survey sheets. All survey sheets are contained in Volume III of this report.

3.3 Energy Analysis

3.3.1 ECOs. Energy savings for ECOs were calculated using standard methods documented in a variety of engineering texts including the ASHRAE Handbooks. Cost estimates were developed using 1994 Means Cost Data or through equipment vendors' quotes. The reference year for all cost estimates are 1995. Energy prices are based on FY 95 rates.

3.3.2 Economics. Economic evaluations were performed using Version 1.0, Level 92 of the Life Cycle Cost in Design (LCCID) computer program available from the BLAST Support Office, Department of Mechanical and Industrial Engineering, University of Illinois at Urbana-Champaign. LCCID calculates life cycle costs, simple payback and SIR for use in evaluating energy conservation opportunities in DOD construction.

3.3.3 Lighting Calculations. Lighting level calculations were done using a PC-based program supplied by USI Lighting, Lite-Pro. Point-by-point calculations were done for each room that was surveyed for two cases: (1)

existing fixtures in the room, and (2) energy-saving fixtures. Lighting changes made in each room designed to meet lighting levels required by AEI design criteria, shown in Table 3-1.

TABLE 3-1 ILLUMINATION IN FUNCTIONAL AREAS OF FACILITIES

Functional Areas	Intensity	
	Lux	Footcandles
Accounting Rooms	810	75
Auditoriums	215	20
Cafeterias	270	25
Computer Rooms	540	50
Conference Rooms	325	30
Corridors	108	10
Drafting Rooms	810	75
Elevator Machine Rooms	160	15
Emergency Generator Rooms	160	15
Garage Driving and Parking Areas	55	5
Garage Entrances	325	30
General Office Spaces	540	50
Janitor's Closets	55	5
Kitchens	750	70
Lobbies	160	15
Lounges	160	15
Mechanical, Electrical and Electronic Communications Rooms	160	15
Parking Lots	5	0.5
Stairways	215	20
Storage Rooms	55	5
Switchgear Rooms	160	15
Toilet Facilities	215	20
Transformer Vaults	160	15

Source: AEI Design Criteria, CEMP-E, 3 July 1994.

4.0 ENERGY ANALYSIS

4.1 Energy Conservation Opportunity (ECO) Evaluations

Each of the ECOs listed in the Scope of Work were reviewed for their applicability and potential for significant energy savings and cost effectiveness and are listed in Table 4-1.

For each of the evaluated ECOs, energy savings were calculated, cost estimates made and Life Cycle Cost (LCC) Analyses performed. A listing of evaluated ECOs along with a summary of the energy and cost savings analysis is shown in Table 4-2. Backup data and calculations are contained in Appendix B, Volume II. Several investigations were made as part of ECO Number 1.

TABLE 4-1 ECOs EVALUATED

	Investigation	Evaluation
1.	Remove unneeded lamps or fixtures.	ECO 1
2.	Reduce indoor lighting where illumination exceeds AEI recommended levels.	ECO 1
3.	Increase daylighting.	ECO 2
4.	Lower light fixtures.	ECO 1
5.	Improve reflection and dispersion with light-colored ceiling and walls	ECO 3
6.	Install occupancy sensors.	ECO 4
7.	Install photocells to lighting near windows	ECO 5
8.	Install additional switches to control lighting arrangements.	ECO 6
9.	Use time clocks to shut off exterior building lights.	ECO 7
10.	Replace incandescent lamps with compact fluorescent lamps.	ECO 1
11.	Replace incandescent exit sign fixtures with LED fixtures.	ECO 8
12.	Replace incandescent lamps in exit signs with compact fluorescent lamps.	ECO 8
13.	Replace standard fluorescent lamps with energy-conserving lamps.	ECO 1

14.	Replace standard fluorescent ballasts with electronic ballasts	ECO 1
15.	Replace existing fluorescent fixtures with new fixtures having efficient reflectors, electronic ballasts, and energy-conserving lamps	ECO 1
16.	Use more efficient lighting source, i.e., upgrade from incandescent to fluorescent, from fluorescent to HID, from mercury vapor to high-pressure sodium, etc.	ECO 1

TABLE 4-2 ECO EVALUATIONS - RESULTS

ECO	PROJECT NAME	TOTAL CONSTRUCTION COST	SAVINGS, MBtu/Yr ELECTRICITY	NET ANNUAL COST SAVINGS	SIR	SIMPLE PAYBACK (YEARS)
1	Upgrade or Replace Lighting	$353,750	2,508	$50,490	1.8	6.7
2	Increase Daylighting	--	--	--	--	--
3	Light-Colored Ceilings and Walls	--	--	--	--	--
4	Install Occupancy Sensors	$14,020	580	$11,700	7.9	1.5
5	Install Photocells	--	--	--	--	34.0
6	Install Additional Switching	--	--	--	--	--
7	Install Time Clocks	--	--	--	--	--
8	LED Exit Signs	$2,450	46	$930	4.6	2.6
	TOTALS	$370,220	3,134	$63,120	2.0	5.9

ECO Number 1

UPGRADE OR REPLACE LIGHTING

Discussion

As shown in Table 4-1, several investigations for energy conservation opportunities were combined into one ECO. Data were taken in each room of each of the 45 surveyed buildings to determine the type and condition of the existing luminaires, representative illumination levels (footcandles) representative types of lamps and ballasts, the room dimensions, the height and location of the fixtures, and the type and accessibility of switching. Notations were done on RS&H-provided data forms, and photographs were taken where allowed by security. Drawings were provided by the Arsenal's Engineering Plans and Services and were also used to note fixture positions. The survey forms are contained in Volume III of this report. Fixture positions in each room were input to the analysis program, and are contained in Volume II, Appendix B.

A PC-based computer program, "Lite-Pro," provided by USI Lighting Company, was used to analyze the illumination levels point-by-point and the unit power density within each room. The program also keeps track of the number of fixtures, by type, for each building and each room.

Initially, analyses were done for the existing luminaires. Although the photometric data base of Lite-Pro is extensive, it was not possible to match existing fixtures exactly to the data base because of lack of manufacturers names and model numbers. Fixture types were noted during the site survey, however, and similar fixtures were selected for analysis. Calculated illuminance levels were reasonably close to those noted on the site survey data sheets, given the wide range of conditions and lifetimes of the existing fixtures.

Point-by-point analysis was then done for each room with the following criteria:

1) Illuminance levels were to be brought into line with AEI recommendations shown in Table 3-1. In many cases, present levels are too high.

2) T8 lamps and electronic ballasts would replace existing T12 lamps and electromagnetic ballasts, including energy-saving lamps and ballasts already in place. The T12 and electromagnetic-technologies should be phased out and the T8 technology adopted installationwide.

3) Existing fixtures would be used where possible. If illuminance levels were reduced, lamps would be removed; reflectors would be installed if necessary to meet AEI footcandle (FC) recommendations. Fixtures would be moved if practical and necessary.

4) Higher-efficiency fixtures would replace low-efficiency fixtures were practical.

5) Compact fluorescent lamps would replace incandescent lamps where practical. Exceptions were made for fixtures with low utilization (e.g., janitors' closets).

6) Excessive fixtures would be removed where necessary.

7) Annual hours of operation for each building were assumed to be 2500. This was based on a 48-hour per week operation 52 weeks per year, based on interviews with personnel in each building.

Table 4-3 shows a summary of the changes made by building based on analysis result. In all:

1) 843 fixtures are removed, and 641 installed. The installed fixtures are various energy-efficient types, and include compact fluorescent replacement of incandescent lamps. All new fixtures employ T8 technology.

2) 3,109 fixtures are changed (upgraded); 8,776 lamps and 4,475 ballasts are removed, and 6,464 T8 lamps and 3,109 electronic ballasts installed; 270 reflectors are also installed in existing fixtures. Of the 8,776 lamps removed, it is estimated through

Table 4-3. Fixture Changeout Summary

	Bldg. No.	Function	Fixtures Removed	Fixtures Installed	Fixtures Upgraded	Reflectors Installed	Std Lmps Removed	WM Lmps Removed	EM Blsts Removed	T8 Lmps Installed	El. Blsts Installed
1	10020	Administration	169	149	44	40	164	0	84	88	44
2	10030	Admin General Purpose	4	2	67	21	224	0	112	155	67
3	10050	Fire HQ	6	4	46	17	126	0	63	92	46
4	13010	Community Services	0	0	28	2	104	0	52	56	28
5	13020	Health Clinic	12	11	34	13	90	0	45	76	34
6	13030	52nd EOD	0	0	25	7	84	0	42	74	25
7	13040	Counseling Facility	5	1	26	0	52	0	26	52	26
8	13060	Clinic	3	0	17	5	68	0	34	34	17
9	13080	Laboratory	21	21	2	0	8	0	4	8	2
10	13100	Infirmary	2	2	15	0	0	38	19	36	15
11	13110	Audio-Visual Facility	5	1	29	0	84	0	42	68	29
12	16210	Barracks (halls, showers, latrines)	8	3	15	0	24	0	15	24	15
13	16220	Barracks (halls, showers, latrines)	8	3	15	0	24	0	15	24	15
14	31010	Electronic Calibration	0	0	6	0	24	0	12	24	6
15	31080	Electronic Calibration	0	0	24	0	0	90	45	68	24
16	32030	Inspection Garage	15	22	4	0	8	0	4	8	4
17	32035	Ordinance Shop	0	0	252	0	504	0	252	504	252
18	32060	Boiler & Compressor House	0	0	9	0	21	0	12	21	9
19	32070	Impreg. & Laundry	1	0	103	0	12	200	106	212	103
20	32090	Warehouse	0	0	60	24	240	0	120	122	60
21	32100	Elect/Comm. Calibration	3	0	135	3	464	0	232	282	135
22	32130	Ammo Quality Assurance	3	2	49	48	194	0	97	98	49
23	32150	Ammo Quality Assurance	0	0	24	4	48	0	24	48	24
24	33060	Boiler & Compressor House	0	0	9	0	21	0	12	21	9
25	33530	Fill and Press (packout areas only)	83	73	0	0	0	0	0	0	0
26	34110	WP Filling	0	0	589	0	1,218	0	609	1,178	589
27	34120	Ammo Quality (south end only)	36	21	40	14	15	96	73	94	40
28	34140	Boiler & Compressor House	16	15	10	0	0	20	10	20	10
29	34910	Admin/FE Maint. Shop	88	81	412	8	1,279	148	715	846	412
30	34970	Administration	12	4	28	0	96	0	48	56	28
31	44100	Production Field Office	70	29	218	5	631	0	344	436	218
32	51420	Offices/DMMD	16	0	118	0	450	2	227	236	118
33	51430	Engineering Administration	8	4	25	0	66	16	41	50	25
34	53160	Chemical Administration	5	5	55	4	178	0	89	110	55
35	60020	Security	26	24	32	4	106	0	53	66	32
36	60060	Administration	3	3	46	35	178	0	89	92	46
37	60070	Fixed Laundry	16	17	60	0	118	8	63	122	60
38	60090	TC Administration	34	33	0	0	0	0	0	0	0
39	60630	Warehouse	10	16	11	0	26	0	13	22	11
40	63100	Chemical Field Maint. Shop	16	0	87	2	134	106	120	174	87
41	63110	Chemical Maint. shop	4	0	75	0	290	0	145	156	75
42	63120	Chemical Field Maint. Shop	3	2	21	0	56	0	28	42	21
43	63200	Chemical Field Maint. Shop	0	0	104	14	398	0	199	344	104
44	63210	Mask Repair	15	0	85	0	34	136	85	170	85
45	63410	Toxic/Conventional Change House	97	93	55	0	34	21	55	55	55
		TOTALS	823	641	3,109	270	7,895	881	4,475	6,464	3,109

sampling the majority of fixtures, that approximately 90 percent are standard and 10 percent energy-saving varieties.

Summary tables for fixture changes in each building, by room, are contained in Section 6 of this Volume.

Table 4-4 is a summarization of the energy analysis results, by building. The table shows comparisons between the existing lighting systems and the proposed replacements:

1) Average unit power density for the 45 buildings will be reduced from 1.3 W/sf to 0.7 W/sf.
2) Total luminaire wattage will be reduced from 565 kW to 271 kW.
3) Annual energy use, assuming 2,500 hours per year average use per fixture, will be reduced from approximately 1,411,620 kWh/yr to 676,925 kWh/yr.

Details of the fixture changes made in each room are contained in Volume II. Room numbers are amended by the designation "-N" to note the analysis of changed fixtures. Analyses for each room are presented together; present fixtures followed by the changed fixtures. Cost summary sheets for each building are also contained in Volume II.

The life cycle cost (LCC) analysis price was $0.0687/kWh, given by the Army procurement Power agency as the 1995 electricity price at Pine Bluff Arsenal. All cost estimates are in 1995 dollars. They were escalated to the assumed mid-point of construction(1996) in the project documentation (Volume IV).

Recommendations

The life-cycle cost analysis program, LCCID 1.092, was used to determine the costs/benefits of the fixtures replacement. Based on the energy savings to Pine Bluff Arsenal, it is recommended that the project be implemented. The ECO showed the following costs/benefits:

Construction Costs ($)	$353,750
Energy Savings (MBtu/yr)	

Table 4-4. Energy Analysis Summary

	Bldg. No.	Function	Present System				Replacement System				Savings	
			W/SF	kW	kWh/yr	# Fixt.	W/SF	kW	kWh/yr	# Fixt.	kW	kWh/yr
1	10020	Administration	3.0	38.5	96,215	214	1.0	11.9	29,658	193	26.6	66,558
2	10030	Admin General Purpose	1.4	8.6	21,465	71	0.6	4.8	11,918	69	3.8	9,548
3	10050	Fire HQ	0.9	10.2	25,483	105	0.7	7.3	18,365	103	2.8	7,118
4	13010	Community Services	2.6	5.2	13,110	32	1.0	2.0	5,010	32	3.2	8,100
5	13020	Health Clinic	1.7	6.6	16,385	57	1.0	3.2	7,890	56	3.4	8,495
6	13030	52nd EOD	1.3	3.5	8,798	26	0.8	2.2	5,405	26	1.4	3,393
7	13040	Counseling Facility	1.6	2.5	6,348	31	1.0	1.6	3,955	27	1.0	2,393
8	13060	Clinic	2.6	3.5	8,840	23	0.9	1.2	3,103	20	2.3	5,738
9	13080	Laboratory	3.1	3.5	8,678	24	1.3	1.4	3,458	24	2.1	5,220
10	13100	Infirmary	1.3	2.5	6,240	24	1.0	1.8	4,415	24	0.7	1,825
11	13110	Audio-Visual Facility	2.3	4.5	11,188	36	1.2	2.3	5,785	32	2.2	5,403
12	16210	Barracks (halls, showers, latrines)	1.3	1.8	4,490	23	0.6	0.9	2,303	18	0.9	2,188
13	16220	Barracks (halls, showers, latrines)	1.3	1.8	4,490	23	0.6	0.9	2,303	18	0.9	2,188
14	31010	Electronic Calibration	3.0	1.0	2,385	6	2.1	0.7	1,650	6	0.3	735
15	31080	Electronic Calibration	1.9	3.2	8,100	24	1.1	1.9	4,870	24	1.3	3,230
16	32030	Inspection Garage	0.6	3.3	8,133	19	0.5	2.5	6,365	26	0.7	1,768
17	32035	Ordinance Shop	1.2	20.7	51,660	252	0.9	14.9	37,170	252	5.8	14,490
18	32060	Boiler & Compressor House	0.3	1.5	3,640	10	0.2	1.0	2,507	10	0.5	1,133
19	32070	Impreg. & Laundry	1.3	14.6	36,573	104	1.0	10.8	27,075	103	3.8	9,498
20	32090	Warehouse	1.6	9.8	24,580	60	0.7	3.6	8,968	60	6.2	15,613
21	32100	Elect/Comm. Calibration	2.4	25.0	62,470	138	1.0	10.1	25,300	135	14.9	37,170
22	32130	Ammo Quality Assurance	2.8	8.4	21,095	52	1.0	3.2	7,893	51	5.3	13,203
23	32150	Ammo Quality Assurance	1.6	2.0	4,980	24	1.1	1.4	3,540	24	0.6	1,440

Table 4-4. Energy Analysis Summary

	Bldg. No.	Function	Present System				Replacement System				Savings	
			W/SF	kW	kWh/yr	# Fixt.	W/SF	kW	kWh/yr	# Fixt.	kW	kWh/yr
24	33060	Boiler & Compressor House	0.3	1.5	3,640	10	0.2	1.0	2,507	10	0.5	1,133
25	33530	Fill and Press (packout areas only)	2.4	17.1	42,713	83	0.6	4.3	10,768	73	12.8	31,945
26	34110	WP Filling	0.6	50.9	127,335	589	0.4	34.7	86,850	589	16.2	40,485
27	34120	Ammo Quality (south end only)	2.1	11.5	28,690	76	0.8	4.1	10,205	61	7.4	18,485
28	34140	Boiler & Compressor House	1.8	3.8	9,433	26	1.0	2.1	5,213	25	1.7	4,220
29	34910	Admin/FE Maint. Shop	2.1	114.5	286,220	507	0.9	41.9	104,640	500	72.6	181,580
30	34970	Administration	3.0	5.7	14,360	42	1.0	2.0	4,890	34	3.8	9,470
31	44100	Production Field Office	1.4	34.6	86,613	300	0.6	15.0	37,620	259	19.6	48,993
32	51420	Offices/DMMD	2.8	20.8	52,060	134	1.0	7.0	17,405	118	13.9	34,655
33	51430	Engineering Administration	2.7	4.5	11,330	33	1.2	1.9	4,838	29	2.6	6,493
34	53160	Chemical Administration	2.0	7.7	19,268	60	0.9	3.4	8,385	60	4.4	10,883
35	60020	Security	0.9	7.8	19,515	58	0.4	3.6	9,030	58	4.2	10,485
36	60060	Administration	2.2	7.6	19,123	51	0.9	3.0	7,428	51	4.7	11,695
37	60070	Fixed Laundry	1.7	8.3	20,865	76	1.0	4.8	12,033	77	3.5	8,833
38	60090	TC Administration	3.3	6.0	15,120	34	1.0	1.9	4,668	33	4.2	10,453
39	60630	Warehouse	0.7	6.2	15,458	39	0.6	5.1	12,668	45	1.1	2,790
40	63100	Chemical Field Maint. Shop	1.6	14.1	35,203	103	0.8	7.0	17,595	87	7.0	17,608
41	63110	Chemical Maint. shop	1.4	14.1	35,148	80	0.5	5.1	12,650	76	9.0	22,498
42	63120	Chemical Field Maint. Shop	0.9	10.2	25,535	56	0.8	8.5	21,165	55	1.7	4,370
43	63200	Chemical Field Maint. Shop	1.4	16.5	41,315	104	0.8	9.4	23,400	104	7.2	17,915
44	63210	Mask Repair	1.0	11.3	28,220	103	0.7	7.8	19,383	88	3.5	8,838
45	63410	Toxic/Conventional Change House	1.0	7.6	19,115	168	0.8	5.9	14,685	163	1.8	4,430
		TOTALS	1.2	564.6	1,411,618	4,110	0.6	270.8	676,925	3,928	293.9	734,693

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: PBA01
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: PINE BLUFF ARSREGION NOS. 6 CENSUS: 3
PROJECT NO. & TITLE: 1 LIGHTING STUDY
FISCAL YEAR 95 DISCRETE PORTION NAME: LIGHTING
ANALYSIS DATE: 03-27-95 ECONOMIC LIFE 15 YEARS PREPARED BY: C. WARREN

1. INVESTMENT

A. CONSTRUCTION COST	$ 315851.		
B. SIOH	$ 18951.		
C. DESIGN COST	$ 18951.		
D. TOTAL COST (1A+1B+1C)	$ 353753.		
E. SALVAGE VALUE OF EXISTING EQUIPMENT	$	0.	
F. PUBLIC UTILITY COMPANY REBATE	$	0.	
G. TOTAL INVESTMENT (1D - 1E - 1F)			$ 353753.

2. ENERGY SAVINGS (+) / COST (-)
DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST $/MBTU(1)	SAVINGS MBTU/YR(2)	ANNUAL $ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	$ 20.13	2508.	$ 50486.	12.02	$ 606842.
B. DIST	$ .00	0.	$ 0.	14.23	$ 0.
C. RESID	$ .00	0.	$ 0.	15.87	$ 0.
D. NAT G	$ .00	0.	$ 0.	14.17	$ 0.
E. COAL	$ .00	0.	$ 0.	13.28	$ 0.
F. PPG	$ .00	0.	$ 0.	13.49	$ 0.
M. DEMAND SAVINGS			$ 0.	11.94	$ 0.
N. TOTAL		2508.	$ 50486.		$ 606842.

3. NON ENERGY SAVINGS(+) / COST(-)

A. ANNUAL RECURRING (+/-)		$ 2229.
(1) DISCOUNT FACTOR (TABLE A)	11.94	
(2) DISCOUNTED SAVING/COST (3A X 3A1)		$ 26614.

B. NON RECURRING SAVINGS(+) / COSTS(-)

ITEM	SAVINGS(+) COST(-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS(+)/ COST(-)(4)
d. TOTAL	$ 0.			0.

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4)	$ 26614.
4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE))	$ 52715.
5. SIMPLE PAYBACK PERIOD (1G/4)	6.71 YEARS
6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C)	$ 633456.
7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)=	1.79
(IF < 1 PROJECT DOES NOT QUALIFY)	

Electricity	2,508
Energy Cost Savings ($/yr)	50,500
SIR	1.8
Simple Payback (years)	6.7

Energy cost savings include the savings from the reduction in A/C loads (estimated at $2,600 per year). Economic life of the project was assumed to be 15 years.

ECO Number 2

INCREASE DAYLIGHTING

Discussion

No opportunities were observed to cost-effectively increase daylighting to accomplish energy savings.

Recommendations

This ECO is not recommended.

ECO Number 3

LIGHT-COLORED CEILINGS AND WALLS

Discussion

The use of light-colored ceilings and walls are a means of increasing the reflectance of light fixtures. However, point-by-point calculations show only marginal increases from light-colored walls compared to increasing the fixture's efficiency.

Recommendations

It is not recommended to re-paint or install new ceilings based on energy savings. Whenever painting is done as a part of building maintenance, use of light-colored paints are recommended.

ECO Number 4

OCCUPANCY SENSORS

Discussion

The site survey revealed that lights were on in many unoccupied areas. Candidates for occupancy sensors are restrooms, breakrooms, conference rooms and offices. Screening calculations showed that occupancy sensors in restrooms and breakrooms offer potential simple paybacks within the ten-year limitation.

Recommendations

The LCC analysis program, LCCID 1.092, was used to determine the costs/benefits of the installation of occupancy sensors. A 15-year economic life was used, and an electricity price of $0.0687/kWh. Based on the energy savings to Pine Bluff Arsenal, it is recommended that the project be implemented. The ECO showed the following costs/benefits:

Construction Costs ($)	$14,019
Energy Savings (MBtu/yr)	
Electricity	581
Energy Cost Savings ($/yr)	11,700
SIR	7.9
Simple Payback (years)	1.5

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: PBA01
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: PINE BLUFF ARSREGION NOS. 6 CENSUS: 3
PROJECT NO. & TITLE: 1 LIGHTING STUDY
FISCAL YEAR 95 DISCRETE PORTION NAME: OCCUPANCY SENSORS
ANALYSIS DATE: 03-27-95 ECONOMIC LIFE 15 YEARS PREPARED BY: C. WARREN

1. INVESTMENT

A. CONSTRUCTION COST	$ 12517.	
B. SIOH	$ 751.	
C. DESIGN COST	$ 751.	
D. TOTAL COST (1A+1B+1C)	$ 14019.	
E. SALVAGE VALUE OF EXISTING EQUIPMENT	$ 0.	
F. PUBLIC UTILITY COMPANY REBATE	$ 0.	
G. TOTAL INVESTMENT (1D - 1E - 1F)		$ 14019.

2. ENERGY SAVINGS (+) / COST (-)
DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST $/MBTU(1)	SAVINGS MBTU/YR(2)	ANNUAL $ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	$ 20.13	581.	$ 11700.	12.02	$ 140629.
B. DIST	$ .00	0.	$ 0.	14.23	$ 0.
C. RESID	$ .00	0.	$ 0.	15.87	$ 0.
D. NAT G	$ .00	0.	$ 0.	14.17	$ 0.
E. COAL	$ .00	0.	$ 0.	13.28	$ 0.
F. PPG	$ .00	0.	$ 0.	13.49	$ 0.
M. DEMAND SAVINGS			$ 0.	11.94	$ 0.
N. TOTAL		581.	$ 11700.		$ 140629.

3. NON ENERGY SAVINGS(+) / COST(-)

A. ANNUAL RECURRING (+/-) $ -2462.
(1) DISCOUNT FACTOR (TABLE A) 11.94
(2) DISCOUNTED SAVING/COST (3A X 3A1) $ -29396.

B. NON RECURRING SAVINGS(+) / COSTS(-)

ITEM	SAVINGS(+) COST(-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS(+)/ COST(-)(4)
d. TOTAL	$ 0.			0.

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4) $ -29396.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) $ 9238.

5. SIMPLE PAYBACK PERIOD (1G/4) 1.52 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) $ 111232.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 7.93
(IF < 1 PROJECT DOES NOT QUALIFY)

ECO Number 5

INSTALL PHOTOCELLS

Discussion

Screening calculations for this ECO showed that the measure would not be cost effective. The costs of controls, the sensor, and dimming ballasts make the simple payback in excess of 30 years for a typical south-facing office with windows (having four, two-lamp T-8 fixtures).

Recommendations

Based on costs/benefits, this ECO is not recommended.

ECO Number 6

INSTALL ADDITIONAL SWITCHING

Discussion

Most areas observed had adequate and available switching. Opportunities for this ECO are limited.

Recommendations

This ECO is not recommended for implementation.

ECO Number 7

INSTALL TIME CLOCKS FOR EXTERIOR BUILDING LIGHTS

Discussion

Virtually all exterior lights of the 45 buildings were off during daylight hours, as observed during the survey.

Recommendations

This ECO is not needed and is not recommended. Education of building occupants is the most effective measure.

ECO Number 8

LED EXIT SIGN LAMPS

Discussion

The majority of exit signs in the 45 surveyed buildings contain two, 15-watt incandescent lamps. LED lamps are a low-cost, energy-efficient retrofit. It was noted that many exit signs are burned out, and many exits do not have signs.

A survey of the drawings show that there are a total of approximately 225 exits in the 45 buildings. Ten of the exits have radioactive signs, and 55 have existing signs. This project is for retrofits of the 55 signs, only.

Recommendations

Based on the cost/benefits to Pine Bluff Arsenal, it is recommended that ECO Number 8 be implemented. The ECO shows the following costs/benefits:

Construction Costs ($)	$2,454
Energy Savings (MBtu/yr)	
Electricity	46
Energy Cost Savings ($/yr)	932
SIR	4.6
Simple Payback (years)	2.6

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: PBA01
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: PINE BLUFF ARSREGION NOS. 6 CENSUS: 3
PROJECT NO. & TITLE: 1 LIGHTING STUDY
FISCAL YEAR 95 DISCRETE PORTION NAME: LED EXIT SIGNS
ANALYSIS DATE: 03-27-95 ECONOMIC LIFE 15 YEARS PREPARED BY: C. WARREN

1. INVESTMENT

A. CONSTRUCTION COST	$ 2190.		
B. SIOH	$ 132.		
C. DESIGN COST	$ 132.		
D. TOTAL COST (1A+1B+1C)	$ 2454.		
E. SALVAGE VALUE OF EXISTING EQUIPMENT		$ 0.	
F. PUBLIC UTILITY COMPANY REBATE		$ 0.	
G. TOTAL INVESTMENT (1D - 1E - 1F)			$ 2454.

2. ENERGY SAVINGS (+) / COST (-)
DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST $/MBTU(1)	SAVINGS MBTU/YR(2)	ANNUAL $ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	$ 20.13	46.	$ 932.	12.02	$ 11203.
B. DIST	$ .00	0.	$ 0.	14.23	$ 0.
C. RESID	$ .00	0.	$ 0.	15.87	$ 0.
D. NAT G	$ .00	0.	$ 0.	14.17	$ 0.
E. COAL	$ .00	0.	$ 0.	13.28	$ 0.
F. PPG	$ .00	0.	$ 0.	13.49	$ 0.
M. DEMAND SAVINGS			$ 0.	11.94	$ 0.
N. TOTAL		46.	$ 932.		$ 11203.

3. NON ENERGY SAVINGS(+) / COST(-)

A. ANNUAL RECURRING (+/-)		$ 0.
(1) DISCOUNT FACTOR (TABLE A)	11.94	
(2) DISCOUNTED SAVING/COST (3A X 3A1)		$ 0.

B. NON RECURRING SAVINGS(+) / COSTS(-)

ITEM	SAVINGS(+) COST(-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS(+)/ COST(-)(4)
d. TOTAL	$ 0.			0.

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4) $ 0.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) $ 932.

5. SIMPLE PAYBACK PERIOD (1G/4) 2.63 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) $ 11203.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 4.57
(IF < 1 PROJECT DOES NOT QUALIFY)

4.2 Multiple ECO Project Evaluations

ECIP Number 1
LIGHTING RETROFITS

Discussion

This project combines several ECOs as listed below:

ECO #	ECO Description
1	Upgrade or Replace Lighting
4	Occupancy Sensors
8	LED Exit Sign Retrofits

Detailed discussions are contained in the previous section (4.1).

Recommendations

The life-cycle cost analysis program LCCID 1.092, was used to determine the cost/benefits of this ECIP. Based on the energy savings to Pine Bluff Arsenal, it is recommended. The results are summarized below.

Construction Cost	$370,226
Annual Energy Savings (MBtu/year)	
Electricity	3,135
Annual Energy Cost Savings ($/year)	$63,108
SIR	2.0
Simple Payback (years)	5.9

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: PBA01
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: PINE BLUFF ARSREGION NOS. 6 CENSUS: 3
PROJECT NO. & TITLE: 1 LIGHTING STUDY
FISCAL YEAR 95 DISCRETE PORTION NAME: TOTAL
ANALYSIS DATE: 03-27-95 ECONOMIC LIFE 15 YEARS PREPARED BY: C. WARREN

1. INVESTMENT

A. CONSTRUCTION COST	$ 330558.	
B. SIOH	$ 19834.	
C. DESIGN COST	$ 19834.	
D. TOTAL COST (1A+1B+1C)	$ 370226.	
E. SALVAGE VALUE OF EXISTING EQUIPMENT	$ 0.	
F. PUBLIC UTILITY COMPANY REBATE	$ 0.	
G. TOTAL INVESTMENT (1D - 1E - 1F)		$ 370226.

2. ENERGY SAVINGS (+) / COST (-)
DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST $/MBTU(1)	SAVINGS MBTU/YR(2)	ANNUAL $ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	$ 20.13	3135.	$ 63108.	12.02	$ 758553.
B. DIST	$ .00	0.	$ 0.	14.23	$ 0.
C. RESID	$ .00	0.	$ 0.	15.87	$ 0.
D. NAT G	$ .00	0.	$ 0.	14.17	$ 0.
E. COAL	$ .00	0.	$ 0.	13.28	$ 0.
F. PPG	$ .00	0.	$ 0.	13.49	$ 0.
M. DEMAND SAVINGS			$ 0.	11.94	$ 0.
N. TOTAL		3135.	$ 63108.		$ 758553.

3. NON ENERGY SAVINGS(+) / COST(-)

A. ANNUAL RECURRING (+/-)		$ -233.
(1) DISCOUNT FACTOR (TABLE A)	11.94	
(2) DISCOUNTED SAVING/COST (3A X 3A1)		$ -2782.

B. NON RECURRING SAVINGS(+) / COSTS(-)

ITEM	SAVINGS(+) COST(-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS(+)/ COST(-)(4)
d. TOTAL	$ 0.			0.

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4) $ -2782.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) $ 62875.

5. SIMPLE PAYBACK PERIOD (1G/4) 5.89 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) $ 755771.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 2.04
(IF < 1 PROJECT DOES NOT QUALIFY)

5.0 ENERGY PLAN

5.1 Project Packaging

The ECOs listed in Table 4-2 are recommended for packaging into a single ECIP project. The guidelines to qualify as an ECIP project are project cost greater than $300,000, simple payback less than ten years, and SIR greater than 1.25. This project is programmed for FY 96 funding.

5.2 Energy and Cost Savings

The implementation of all projects yield a total annual energy savings of 3,135 MBtu and annual cost savings equal to $62,875, which represents a reduction of 3.6 percent and 4.4 percent, respectively in total electrical energy use and cost when compared to FY 94 values. Based on FY 94 values, the energy use and costs before and after project implementation are shown in the following table:

TABLE 5-1 EFFECTS OF PROJECT IMPLEMENTATION

	BEFORE	AFTER	% REDUCTION
Electricity Use (MBtu/yr)	86,045	82,410	3.6
Electricity Cost ($/yr)	1,414,909	1,352,034	4.4

Source: ADDS

5.3 Project Schedule

The project implementation date is estimated to be FY 96.

6.0 BUILDING CALCULATIONS

As explained in Section 4, illuminance calculations were performed for the fixtures in each room in each of the surveyed buildings, for both the existing fixtures and the proposed fixtures, either changed or retrofitted. Tables are presented on the following pages for each building showing the observed and calculated illuminances within each room. The table headings are as follows:

Room - Room number on description.

AEI Classification - Room classification according to Table 3-1. Several classifications of rooms are not noted on the AEI classification list provided by the Corps of Engineers, and are left blank. Efforts were made to provide illuminance levels based on usual activities (e.g., 75 FC for a laboratory).

Maximum Required FC - Maximum required footcandles according to AEI standards. The AEI requirement is for "...general illumination levels...will not exceed the intensities shown in Table 12-4" (reproduced as Table 3-1).

Maximum Meas. FC - The maximum footcandles measured during the site survey. All measurements and calculations were done at a height of 2.5 feet above the floor. See the site survey data forms, Volumes IIIA and IIIB.

Present Avg. Calc. FC - The average footcandles calculated for the present fixture layout. The average FC calculations are always lower than the maximum. To get a more complete view of the light distribution and intensity within each room, see the detailed calculations contained in Volumes IIA through IIE. It was assumed that all lamps and ballasts were functioning. Reflectances were assumed to be the following: ceiling, 0.8; walls, 0.5; floor, 0.2. If ceilings were very dirty, reflectances were reduced to 0.2.

Present LLF - The light-loss-factor (LLF) used for each of the present fixtures. The LLF is the product of the ballast factor, the lamp depreciation factor and the dirt depreciation factor. For electromagnetic ballasts, the factor is usually set at ~0.95. The lamp depreciation and the dirt depreciation are somewhat subjective. For new or fairly-new lamps, the depreciation factor is usually set at 0.9 to take into account at 10 percent light loss over the average lifetime of the lamp. Dirt depreciation is a function of fixture and room conditions. Office environments are usually taken as clean; production area environments as medium. The depreciation for yellowed lenses or generally dirty fixtures was also factored in. The following dirt depreciation factors were used: very clean, 0.87; clean, 0.81; medium, 0.75; dirty, 0.68; very dirty, 0.61.

As stated in Section 4, the present-fixture calculation factors were adjusted to try to approximate the observed conditions. The reader must be cautioned, however, that the fixture selections and depreciation factors are only approximations, and are meant to present a situation showing where changes in fixture components can be made to increase efficiencies and improve lighting quality.

Proposed Avg. Calc. FC - The average foot-candles calculated for the changed fixtures, either retrofits or new. Illuminance contours are presented for each room in Volumes IIA - IIE and should be consulted for a more accurate analysis of the lighting calculations. Reflectances were assumed to remain the same as the present case.

Proposed LLF - The light loss factor used for the new or retrofit fixtures. Electronic Ballast factor was taken as 0.88 - 0.90, lamp depreciation as 0.9, dirt depreciation as 0.87 (assuming fixtures are cleaned). Fixtures retrofit with reflectors would be considered as new (dirt depreciation = 1.0). Lamps above a porous ceiling grid had a miscellaneous depreciation factor added to account for light loss.

* Multiple Fixtures Used

Pine Bluff Arsenal Calculations Summary

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
10-020	Break	Lounge	15	42	27	.36/.72*	21	0.59
	Vending	Lounge	15	23	19	0.47	24	0.58
	100	Office	50	58	48	0.51	50	0.79
	101	Office	50	60	53	0.51	46	0.79
	103	Office	50	58	59	0.51	50	0.79
	106	Office	50	70	62	0.68	44	0.79
	107	Office	50	56	78	0.68	40	0.79
	112	Office	50	66	53	0.51	40	0.79
	Hall	Corridor	10	44	37	0.51	10	0.47
	115	Office	50	86	76	0.51	42	0.79
	117	Office	50	83	57	.68/.51*	43	0.79
	201/203	Office	50	73	39	0.48	39	0.79
	202	Office	50	88	60	0.73	47	0.79
	205	Office	50	67	67	0.51	56	0.79
	206	Office	50	60	58	0.68	43	0.79
	207	Office	50	72	66	0.84	37	0.79
	209	Office	50	78	66	0.84	37	0.79
	221	Office	50	58	40	0.51	40	0.79
	223/229	Office	50	61	70	0.68	42	0.79
	228	Office	50	35	47	0.51	36	0.79
	231	Office	50	79	31	0.51	36	0.79
	232	Office	50	50	46	0.51	35	0.79
	263	Office	50	69	50	0.51	43	.69/.79*
	265	Office	50	41	42	0.51	36	0.79
	266	Office	50	79	45	0.51	46	0.79
	267	Office	50	73	45	0.51	47	0.79
	269	Office	50	56	43	0.51	44	0.79
	270	Office	50	89	48	0.51	45	0.79
	282	Office	50	95	63	0.73	39	0.79
	284	Office	50	57	43	0.51	34	0.79
	286B	Office	50	66	58	.58/.73*	40	0.79
	288	Office	50	82	59	0.68	45	0.79
	289	Storage	5	39	27	0.68	6	0.83
	292A	Office	50		40	0.51	47	0.88
	292	Office	50	37	28	.51/.68*	33	0.79
	290	Lounges	15	79	61	0.51	23	0.69
	215	Office	50	50	77	0.51	40	0.69
	213/216	Office	50	67	23	.48/.68*	24	0.79
	217	Office	50	46	56	0.51	45	0.79
	Cashier	Office	50		62	.68/.73*	44	.69/.79*
	Restroom	Toilet	20	51	65	.68/.73/.77*		

* Multiple Fixtures Used

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present Avg Calc FC	Present LLF	Proposed Avg Calc FC	Proposed LLF
10-030	Conference	Conference	30	65	43	0.68	30	0.79
	Ent Hall	Corridor	10	38	22	0.63	14	0.64
	File Rm 1	Office	50	49	43	0.63	35	0.79
	Storage	Storage	5	78	32	0.63	26	0.64
	Office 1	Office	50	71	42	0.63	35	0.79
	Open Office 1	Office	50	52	41	0.63	43	0.64
	Office 2	Office	50	58	43	0.63	42	0.69
	Office 2,3,4,5,6	Office	50	91	43	0.63	42	0.69
	Breakroom	Lounge	15		18	0.63	20	0.64
	Restroom	Toilet	20	56	40	0.73	17	0.73
	Janitor Rm	Janitorial Clst.	5	63	56	0.68	15	0.68
	Office 7	Office	50	43	27	0.68	35	0.79
	Office 8	Office	50	53	52	0.63	50	0.69
	E Entrance 1	Corridor	10	65	22	0.68	22	0.64
	Hallway	Corridor	10	64	18	0.63	17	0.64
	Restroom	Toilet	20	21	12	0.68	14	0.69
	Office 9	Office	50	52	18	0.63	17	.64/.79*
	Open Office 2	Office	50	81	60	0.68	43	0.79
	Computer Rm	Computer Rm	50	71	50	0.68	41	0.69
	S entrance			101	57	0.68	14	0.68

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present Avg Calc FC	Present LLF	Proposed Avg Calc FC	Proposed LLF
10-050	Foyer	Corridor	10	76	47	0.68	17	0.84
	Office 1	Office	50	73	47	0.68	35	0.84
	Bay 1	Garage	5	27		0.67		
	Bay 2	Garage	5	19		0.68		
	Office 2	Office	50	66	47	0.68	35	0.84
	Hallway	Corridor	10	39	34	0.73	31	0.66
	Dining	Cafeteria	25	24		.72/.78*		
	Kitchen	Kitchen	70	40	46	0.68	68	0.84
	Lounge	Lounge	15		23	0.73	21	0.66
	Exercise			44	29	0.73	26	0.66
	Laundry			45	27	0.73	25	0.66
	Sleeping Area			27	10	.73/.76*	9	.66/.76*
	TV Room	Lounge	15		54	0.68	27	0.66
	Office 3	Office	50	59	50	0.68	36	0.84
	Ladies Rm	Toilet	20	54	49	0.68	24	0.66
	Bay 3	Garage	5	20		0.67		

* Multiple Fixtures Used

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
13-010	Offices	Office	50	55	62	0.68	43	0.81
	Restroom	Toilet	20	20		.60/.75*		
	Training Room	Office	50	53	76	0.68	41	0.7
	Hallway	Corridor	10		19	0.68	21	0.7

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
13-020	Waiting Room	Lobby	15	56	27	0.68	24	0.66
	Entrance Foyer	Corridor	10	34		0.73		0.7
	Recep Office	Office	50	48		0.73		0.7
	Records Office	Office	50	38		0.73		0.7
	Office 1	Office	50			0.73		0.81
	Womens Rm	Toilet	20	5		0.77		
	Mens Rm	Toilet	20			0.77		
	Doctors Office	Office	50	58		.68/.73*		0.81
	Exam Room	Office	50	50		0.73		0.81
	Patient Lobby	Lobby	15	22		0.68		0.66
	Hallway	Corridor	10	53		.68/.73/.77*		.66/.77*
	X-Ray Develp			13				
	X-Ray Reading			14				
	X-Ray	Office	50	66	49	0.68	38	0.9
	X-Ray Tech			20	29	0.58	30	0.81
	Waiting Room	Lobby	15	29	29	0.58	30	0.81
	Restroom	Toilet	20	6		0.77		
	Records Stg	Storage	5	25	23	0.73	21	0.7
	Hallway 2	Corridor	10	35	32	0.58	20	0.66
	Scrub Room	Office	50	51	68	0.68	53	0.9
	Operating Rm			62	67	0.68	63	0.69
	Medicine Stg		50	98	87	0.68	69	0.9
	Ambulance Ent	Corridor	10		14	0.68	13	0.66

* Multiple Fixtures Used

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
13-030	Operations	Office	50	89	61	0.68	44	0.81
	Clerks Room	Office	50	14	33	0.68	29	0.66
	Commander Off	Office	50	49	34	0.68	30	0.66
	Security Room	Office	50	20	17	0.68	15	0.66
	SR Supervisor	Office	50	39	37	0.68	33	0.66
	Pubs. Room	Office	50	35	37	0.68	33	0.66
	Latrine	Toilet	20	44	17	0.68	15	0.66
	Equip. Room	Storage	5	18	19	0.68	17	0.66
	Laundry				19	0.68	17	0.66
	Maint Office	Office	50	59	37	0.68	33	0.66
	Supply Storage	Storage	5	11	17	0.68	15	0.66
	Supply Office	Office	50	25	37	0.68	33	0.66
	Dressing Room	Lounge	15		17	0.68	26	0.81
	Classroom	Conference	30	47	52	0.68	47	0.66
	Classroom Off	Office	50	54	32	0.68	29	0.66
	Kitchen	Kitchen	70	43	33	0.68	30	0.66
	Work Room	Office	50	18	20	0.68	30	0.81
	Tool Room	Storage	5	18	25	0.68	22	0.66
	Latrine	Toilet	20		7	0.77		
	Hallway	Corridor	10	48	20	0.68	14	0.81

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
13-040	1	Office	50	44	38	0.68	34	0.66
	2	Lounge	15	44	30	0.68	27	0.66
	3	Office	50	53	38	0.71	35	0.69
	4	Office	50	52	47	0.71	43	0.69
	5	Office	50	64	47	0.71	43	0.69
	6	Storage	5		47	0.71	43	0.69
	7	Office	50	53	32	.71/.82*	29	.50/.69*
	8	Office	50	66	49	0.71	45	0.69
	9	Lounge	15	89	52	0.71	31	0.69
	Mens Rm	Toilet	20	63	19	0.71		0.69
	Womens Rm	Toilet	20		32	0.71	29	0.69
	Hallway	Corridor	10	43	45	0.71	19	0.69

* Multiple Fixtures Used

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
13-060	TV Room	Lounge	15	28	16	0.68		
	Supervisor Off	Office	50	60	54	0.68	47	0.81
	Eye Exam	Office	50	60	60	0.68	52	0.81
	Restroom 1	Toilet	20	39	47	0.68	28	0.66
	Stg Room 1	Storage	5		46	0.68	28	0.66
	Office 1	Office	50	86	84	0.68	51	0.66
	Office 2	Office	50	85	71	0.68	43	0.66
	Recept Room	Office	50	74	84	0.68	51	0.66
	Hallway	Corridor	10	56	61	0.68	16	0.66

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
13-080	Lab Area 1			62	47	.58/.81*	42	0.66
	Lab Area 2			56	45	0.58	33	0.66
	Storage	Storage	5		10	0.81		
	Urinalysis			54	49	0.58	42	0.66
	Vini-Puncture			88	71	0.68	64	0.66
	Office	Office	50	38	41	0.58	34	0.66
	Womens Rm	Toilet	20	22	18	0.82	19	0.5
	Mens Rm	Toilet	20	10	18	0.82	19	0.5

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
13-100	Waiting Rm	Lobby	15	22	28	0.68	30	0.66
	Pharmacy			50	41	0.68	44	0.66
	Pharm Offfice	Office	50	52	41	0.68	43	0.66
	Storage 1	Storage	5	40	35	0.68	18	0.66
	Hallway	Corridor	10		15	0.68	16	0.66
	Pharmacy Stg	Storage	5	10	7	0.76		
	Storage 2	Storage	5	57	43	0.68	27	0.66
	Restroom	Toilet	20	16	7	0.76		
	Mech Room	Mechanical	15	27	22	0.68	24	0.66
	Dental Rm 2			24	16	0.68		
	Dental Rm 1			20	29	0.68		
	Dental Stg	Storage	5	22	20	0.68		
	X-Ray			34	20	0.68		

* Multiple Fixtures Used

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present Avg Calc FC	Present LLF	Proposed Avg Calc FC	Proposed LLF
13-110	Reestroom	Toilet	20	12				
	Open Area 1	Office	50	120	75	0.68	45	.50/.66*

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present Avg Calc FC	Present LLF	Proposed Avg Calc FC	Proposed LLF
16-210	Hallway	Corridor	10	43	24	0.68	15	0.66
	Kitchen	Kitchen	70	43	25	0.68	22	0.66
	Latrine&Laun	Toilet	20	35	18	0.68	16	0.66
	2nd Floor Hall	Corridor	10	45	28	0.68	13	0.66
	Latrine 2	Toilet	20		18	.60/.68*	16	.58/.66*

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present Avg Calc FC	Present LLF	Proposed Avg Calc FC	Proposed LLF
31-010	Calibration Lb			99	78	0.68	71	0.66

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present Avg Calc FC	Present LLF	Proposed Avg Calc FC	Proposed LLF
31-080	Foyer	Corridor	10	52	22	.63/.68*	16	0.66
	Restroom	Toilet	20	32	13	0.63	14	0.66
	Breakroom	Lounge	15	78	60	0.63	36	0.66
	TMDE Storage	Storage	5	58	47	0.63	53	0.66
	Lab			60	66	0.63	68	0.66
	Office	Office	50	86	56	0.63	34	0.66
	Computer	Computer	50	46	42	0.63	68	0.66

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present Avg Calc FC	Present LLF	Proposed Avg Calc FC	Proposed LLF
32-030	Tire Shop			65	21	0.79	29	0.66

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present Avg Calc FC	Present LLF	Proposed Avg Calc FC	Proposed LLF
32-035	Motor Pool			30	50	0.68	45	0.66

* Multiple Fixtures Used

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
32-060	Compress Rm	Mechanical	15	54	19	0.72	17	0.7
	Boiler Room	Mechanical	15		3	.68/.76*	3	.66/.76*

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
32-070	Laundry			55	57	0.69	56	0.66
	Incpreg Area				47	0.69	46	0.66
	Breakroom	Lounge	15	36	63	0.69	40	0.66
	Mens Rm	Toilet	20	6	20	0.69	19	0.66
	Ladies Rm	Toilet	20	6	20	0.69	19	0.66
	Office	Office	50	44	25	0.68	23	0.66

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
32-090	1	Office	50	28	73	0.68	42	0.66
	2	Corridor	10		30	0.68	18	0.66
	3					0.68		
	4	Toilet	20	86	58	0.68	35	0.66
	5	Toilet	20	86	58	0.68	35	0.66
	6	Office	50	106	83	0.68	50	0.66
	7	Office	50	43	19	0.68	22	0.67
	8	Storage	5	60	40	0.68	33	0.81
	9	Office	50	104	33	0.68	42	0.81
	10	Lounge	15	89	39	0.68	23	0.66
	11	Office	50	53	48	0.68	42	0.81
	12	Office	50	35	40	0.68	35	0.81
	13	Conf Room	30	91	86	0.68	39	0.66
	14	Storage	5		25	0.78		
	15	Storage	5		25	0.78		
	16	Toilet	20	83	30	0.68	19	0.66

* Multiple Fixtures Used

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
32-100	Office 1	Office	50	76	59	0.68	44	0.66
	Office 2	Office	50	87	59	0.68	34	0.66
	Break Room	Lounge	15	32	41	0.68	21	0.66
	Restroom	Toilet	20	26	32	0.73	29	0.7
	Ent/Hall	Corridor	10	19	34	0.68	30	0.66
	Storage 1	Storage	5	39	25	0.68	23	0.66
	Lab			100	106	0.68	54	0.66
	Hallway	Corridor	10	73	52	0.68	10	0.66
	Electr Testing			67	53	0.68	50	0.66
	Storage 2	Storage	5	33	26	0.68	23	0.66
	Training Area			58	65	0.68	33	0.66
	Rebuild Shop			120	74	.67/.68*	46	0.66

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
32-130	Lab			87	95	0.68	52	0.66
	Sub Lab			124	67	0.68	37	0.66
	Restrooms	Toilet	20	22	24	0.6	15	0.5
	Storage	Storage	5	10	37	0.68	18	0.66

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
32-150	Offices	Office	50	39				
	Restrooms	Toilet	20	42				

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
33-060	Compress Rm	Mechanical	15	54	19	0.72	17	
	Boiler Room	Mechanical	15		3	.68/.76*	3	

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
33-530	North End			38	39	.53/.78*	28	0.66
	NE Corner			49	38	0.78	29	0.66
	SW End			39	29	.53/.78*	30	0.66

* Multiple Fixtures Used

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present Avg Calc FC	Present LLF	Proposed Avg Calc FC	Proposed LLF
34-110	Packing			11	18	0.68	17	0.66
	Paint Shop			31	14	0.67	14	0.66
	Packing Office	Office	50	83	138	0.68	72	0.66
	Prep Room			9	10	0.68	10	0.66
	Prod Line 4			20	43	0.68	40	0.66
	Filing	Office	50	53	37	0.68	35	0.66
	Filing Office	Office	50	52	93	0.68	48	0.66

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present Avg Calc FC	Present LLF	Proposed Avg Calc FC	Proposed LLF
34-120	1	Office	50	36	50	0.63	45	0.66
	2	Office	50	25	41	0.63	37	0.66
	3	Corridor	10	37	41	0.58	17	0.66
	4	Office	50	36	64	0.58	48	0.66
	Storage	Storage	5	47	35	0.58	6	0.66
	Breakroom	Lounge	15	51	39	0.68	25	0.66
	Restroom 1	Toilet	20	67	21		20	
	Restroom 2	Toilet	20	48	21		20	
	Lab			44	50		53	
	Office 3	Office	50	51	52	0.68	39	0.66
	Office 4	Office	50	32	90	0.63	42	0.66

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present Avg Calc FC	Present LLF	Proposed Avg Calc FC	Proposed LLF
34-140	Office	Office	50	61	55	0.67	48	0.66
	Water Ch Tst			47	41	0.68	38	0.66
	Boiler	Mechanical	15	29	22	.66/.68/.76*	20	.50/.66*
	Restroom	Toilet	20	23	20	0.68	21	0.66
	Compres Rm 1	Mechanical	15		26	0.66	26	0.66
	Compres Rm 2	Mechanical	15		26	0.66	26	0.66

* Multiple Fixtures Used

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present Avg Calc FC	Present LLF	Proposed Avg Calc FC	Proposed LLF
34-910	Locker Rm 1	Toilet	20	27	31	0.68	27	0.66
	Toilet 1	Toilet	20	35	26	0.68	23	0.66
	Locker Rm 2	Toilet	20	32	35	0.63	34	0.66
	Toilet 2	Toilet	20	27	32	0.63	29	0.66
	Paint Shop			31	17	.34/.68*	30	.34/.80*
	Paint Office	Office	50	93	75	0.63	45	0.67
	Sign Constr			107	120	0.63	64	0.67
	Ent Office	Office	50	75	70	0.64	57	0.67
	PM Conf Rm	Conference	30	67	74	0.68	51	0.61
	PM Hallway	Corridor	10	75	67	0.63	24	0.61
	PM Office 1	Office	50	87	70	0.63	45	0.61
	PM Office 2	Office	50	97	68	0.68	43	0.61
	PM Office 3	Office	50	77	70	0.68	45	0.61
	WO Central	Office	50	42	48	0.68	44	0.67
	WO Office 1	Office	50	35	37	0.68	37	0.61
	WO Office 2	Office	50	35	37	0.68	37	0.61
	WO Hallway	Corridor	10	37	32	0.68	28	0.66
	WO Office 3	Office	50	43	50	0.68	50	0.61
	WO Copy Rm			56	40	0.68	25	0.61
	WO Storage	Storage	5	32	22	0.74		
	WO BreakRm	Lounge	15	128	75	0.68	35	0.61
	WO Secr Area	Office	50	95	64	0.68	40	0.61
	WO Microfile	Office	50	34	44	0.68	35	0.61
	Micro Storage	Storage	5		28	0.68	17	0.61
	Utility Brkrm	Lounge	15	78	108	0.68	27	0.66
	Util Brkrm Kit	Kitchen	70	56	23	0.68	28	0.66
	Util Office	Office	50	53	28	0.68	36	0.66
	Womens Rm	Toilet	20	52	37	0.68	33	0.66
	DR Shower	Toilet	20	30				
	Hall DR 1	Corridor	10	25	17	0.64	12	0.86
	Maint Office	Office	50	92	68	0.68	32	0.7
	Refrig Shop			65	47	0.74	34	0.86
	Refirg Hall	Corridor	10	62	38	.68/.69/.70*	17	0.86
	ElecShpBrkrm	Lounge	15	89	54	.67/.68*	27	0.66
	ElecWrk Area			31	35	0.68	32	0.66
	Elec Office	Office	50	41	59	.68/.73*	40	0.66
	Elec Storage	Storage	5	43	54	0.73	26	0.66
	Elec Storage	Storage	5	31	54	0.73	26	0.66
	Locksmith			109	62	0.68	54	0.81
	Inst Shp Brk	Lounge	15	56	53	0.68	35	0.66
	Inst Wrk Area			44	54	0.68	51	0.81
	Inst Entrance	Corridor	10	50	42	0.68	28	0.66
	Inst Office	Office	50	115	67	0.68	44	0.69
	Wash Area	Toilet	20	43	48	0.68	25	0.66
	Mill Ent	Corridor	10	102	62	0.69	25	0.66
	Mill Office	Office	50	55	77	0.68	40	0.66
	Mill Shop			35	55	.67/.68*	34	0.81
	T&D BreakRm	Lounge	15	52	51	0.68	34	0.69
	T&D Shop							
	BGU Comp	Computer	50	38	42	0.65	38	0.83
	BGU BrkRm	Lounge	15	148	87	0.68	26	0.66

* Multiple Fixtures Used

	BGU Office 1	Office	50	63	49	0.65	54	0.83
	BGU Office 2	Office	50		78	0.65	56	0.83
	BGU Ent	Corridor	10	35	33	0.68	18	0.69
	BGU Kitchen	Kitchen	70	45	30	0.68	17	0.66

* Multiple Fixtures Used

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
34-970	1	Office	50	71	107	0.68	50	0.66
	3	Office	50	90	109	0.68	50	0.66
	4	Office	50	60	104	0.68	60	0.66
	Dir Eng	Office	50	66	77	0.68	38	0.66
	Admin Office	Office	50		69	0.68	43	0.66
	Conf Room	Conference	30	51	79	0.68	38	0.66
	File Room	Office	50	57	58	0.68	19	0.66
	Copier Room			28	27	0.36	30	0.66
	Storage Room	Storage	5	30	30	0.68	26	0.66
	Womens Rm	Toilet	20	32	36	0.68	19	0.66
	Alcove			75	59	0.68	57	0.66
	Mens Room	Toilet	20	27	9	0.82	8	0.5
	Kitchen	Kitchen	70	60	23	0.68	23	0.66
	Hallway	Corridor	10	65	29	0.68	28	0.66

* Multiple Fixtures Used

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
44-100	Cafeteria	Cafeteria	25	28	49	0.68	32	0.66
	CafCook Area	Kitchen	70	72				
	Caf Office	Office	50	111	134	0.68	52	0.66
	Caf Conf	Conference	30	184	90	0.68	24	0.66
	Caf Office	Office	50	121	82	0.68	35	0.66
	Restrooms	Toilet	20		16	0.77	6	0.5
	Caf Hall	Corridor	10		16	0.77	6	0.5
	Eng Office	Office	50	60	64	0.68	38	0.69
	PM Office	Office	50	43	64	0.68	38	0.69
	Admin Office	Office	50	75	75	0.68	39	0.66
	Dir Office	Office	50	82	79	0.68	41	0.66
	Coffee Room	Lounge	15	75	53	0.68	28	0.66
	CAD Office	Office	50	68	59	0.68	31	0.66
	Office 1	Office	50	91	75	0.68	44	0.69
	Stats Office	Office	50	61	67	0.68	35	0.66
	Office 2	Office	50	65	67	0.68	35	0.66
	Office Hall	Corridor	10	50	56	0.68	29	0.66
	Main Hall	Corridor	10	36	5	.68/.77*	4	.50/.66*
	Main Office	Office	50	66	38	0.68	41	0.69
	Office 3	Office	50	71	73	0.68	37	0.66
	Mens Locker	Toilet	20	33	26	0.68	24	0.66
	Shower Area	Toilet	20	64	30	.60/.68*	22	.58/.66*
	LockerRm-Old	Toilet	20	36	43	0.68	39	0.66
	Locker Hall	Corridor	10		27	.73/.77*	12	0.66
	Mens Room	Toilet	20	80	37	0.73	18	0.66
	Mens Shower	Toilet	20	40	23	0.68	20	0.66
	Women Lockr	Toilet	20	48	64	0.68	41	0.66
	WomShowr 1	Toilet	20	10	13	0.73	18	0.66
	WomSowr 2	Toilet	20	12	10	0.39	13	.50/.66*
	Wom Bath Lng	Lounge	15	50	24	0.68	22	0.66
	WomensRm	Toilet	20	46	17	0.73	16	0.66
	Supply Storag	Storage	5	40	46	0.68	42	0.66
	Supp Filing	Office	50	71	54	0.68	28	0.66
	Supp Office	Office	50	32	49	0.68	39	0.66
	Supp Office	Office	50	76	49	0.68	39	0.66

* Multiple Fixtures Used

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present Avg Calc FC	Present LLF	Proposed Avg Calc FC	Proposed LLF
51-420	34	Lounge	15	90	83	0.68	27	0.66
	35	Conference	30	48	77	0.68	49	0.66
	33	Office	50	46	68	0.68	43	0.66
	31	Office	50	53	97	0.68	43	0.66
	29	Office	50	117	83	0.68	53	0.66
	32	Toilet	20	73	34	.60/.68*	21	.58/.66*
	30	Toilet	20	73	21	.60/.68*	14	.58/.66*
	Hall 1	Corridor	10	15				
	27	Office	50	71	70	0.68	45	0.66
	25	Office	50	117	77	0.68	48	0.66
	23	Office	50	61	69	0.68	43	0.66
	21	Office	50	75	70	0.68	45	0.66
	22	Office	50		77	0.68	48	0.66
	20/24	Storage	5	205	96	0.68	45	0.66
	26	Office	50	198	84	0.68	51	0.66
	28	Office	50	89	61	0.68	39	0.66
	Mens Room	Toilet	20	75	91	0.68	30	0.66
	Womens Rm	Toilet	20	70	37	.60/.68*	21	.58/.66*
	7	Office	50	21	23	0.34	30	0.66
	Hallway 2	Corridor	10					
	5	Office	50	105	82	0.68	52	0.66
	3	Office	50	96	82	0.68	36	0.66
	1	Office	50	104	82	0.68	53	0.66
	2	Office	50	25	39	0.68	25	0.66
	4	Office	50	118	83	0.68	36	0.66
	6	Office	50	128	69	0.68	44	0.66
	8	Office	50	94	69	0.68	44	0.66
	10	Office	50		69	0.68	44	0.66
	9	Office	50	84	39	0.68	25	0.66
	12	Office	50	81	61	0.68	39	0.66
	11	Office	50	70	62	0.68	39	0.66
	14	Conference	30	94	62	0.68	39	0.66
	13	Office	50	85	56	0.68	36	0.66
	Comp. Room	Computer	50					

* Multiple Fixtures Used

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
51-430	Office 1	Office	50	86	102	0.68	54	0.66
	Off 1 Shop			89	62	0.72	55	0.7
	Restrooms	Toilet	20		15	0.82	10	0.5
	Office 2	Office	50	42				
	Office 3	Office	50	52	43	0.68	29	0.66
	Off3 RestRm	Toilet	20		13	0.81	12	0.5

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
53-160	Main Area	Office	50	89	57	0.68	34	0.66
	Office 1	Office	50	92				
	Office 2	Office	50	82				
	Office 3	Office	50	84	52	0.68	36	0.69
	Break Room	Lounge	15	33	44	0.68	42	0.66
	WmnsClot Ret			17				
	Womens Rm	Toilet	20	25	30	.60/.68*	26	.58/.64*
	Womens Lckr	Toilet	20	27	26	.68/.76/.81/.82*	21	.50/.64/.66*
	Janitor	Janitor	5	22				
	Office 4	Office	50					
	Store Room	Storage	5	39	50	0.68	30	0.66
	Alcove 1			41				
	MensClotRet			45				
	Mens Room	Toilet	20	61	30	.60/.68*	26	.58/.64*
	Mens Locker	Toilet	20	37	48	.60/.68/.81*	30	.50/.58/.64/.66*
	Com RestRm	Toilet	20					
	Hallway	Corridor	10	67	24	0.68	14	0.66

* Multiple Fixtures Used

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
60-020	Provost	Office	50	34	48	0.58	44	0.69
	Security Spec	Office	50	48	47	0.58	44	0.69
	103	Office	50	27	41	0.58	54	0.69
	105	Office	50	39	38	0.68	47	0.69
	105a	Office	50	24	20	0.58	36	0.69
	107	Office	50	13	16	0.58	28	0.69
	102	Office	50	32	24	0.58	44	0.69
	104	Office	50	31	30	0.58	34	0.69
	Break Room	Lounge	15	15	15	0.58	23	0.69
	Mens Room	Toilet	20	23	11	0.68	12	0.69
	Womens Rm	Toilet	20	11	11	0.68	12	0.69
	Hallways	Corridors	10	80	5	.68/.76*	2	.69/.76*
	Training			30	26	0.68	24	0.66
	LockerRm 1	Toilet	20	37	40	0.68	21	0.66
	Foyer			27	38	0.68	36	0.66
	109			70	41	0.58	34	0.66
	110	Office	50	56	53	0.68	41	0.66
	Radio Room	Office	50	27	80	0.68	47	0.66
	LockerRm 2	Toilet	20	23	58	0.68	30	0.66

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
60-060	Break Rm	Lounge	15	85	56	0.68	35	0.66
	Hallway	Corridor	10	53	33	0.68	29	0.66
	Mens Rm	Toilet	20	20	54	.68/.81*	35	.50/.66*
	Womens Rm	Toilet	20	59	39	.60/.68*	33	.58/.66*
	Janitor	Janitor	5	10	11	0.81	10	0.5
	6	Office	50	67	53	0.68	39	0.69
	Open Office	Office	50	67	63	0.68	48	0.69
	5	Office	50	7	46	0.68	34	0.69
	6	Office	50	66	45	0.68	33	0.69
	Storage	Storage	5	24	28	0.68	25	0.66
	3	Office	50	61	58	0.68	43	0.69
	Open Area 1	Office	50	84	59	0.68	44	0.69
	2	Office	50	76	57	0.68	42	0.69
	1	Office	50	102	57	0.68	42	0.69
	EntHall&Alcov	Corridor	10	53	21	.68/.81*	18	.50/.66*

* Multiple Fixtures Used

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
60-070	CottonStorage	Storage	5	102	101	.67/.68*	47	0.66
	Office	Office	50	19	12	0.68	37	0.66
	Shower	Toilet	20	50	27	0.68	24	0.66
	Mens Locker	Toilet	20	35	12	0.68	25	0.66
	Womens Shwr	Toilet	20	50				
	Hallway	Corridor	10		8	0.68	12	0.66
	Mens Rm	Toilet	20	25	31	0.68	25	0.66
	Repair Stn			21	37	.67/.68/.69*	29	0.66
	Control Rm				4	0.68	4	0.66

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
60-090	Office 1	Office	50	55	56	0.51	46	0.73
	Main Office	Office	50	55	56	0.51	46	0.73
	Entrance	Corridor	10	69	42	0.51	22	0.66
	Office 2	Office	50	37	49	0.51	41	0.73
	File Area	Office	50	50	40	0.51	47	0.63
	Office 3	Office	50	38	42	0.51	35	0.73
	Kitchen	Kitchen	70	54	47	0.51	35	0.66
	Hallway	Corridor	10	57	42	0.51	22	0.66
	Womens Rm	Toilet	20	50	5	.73/.75*	7	.50/.63*
	Mens Rm	Toilet	20	21	6	.73/.75*	7	.50/.63*

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
60-630	Warehouse			6	13	0.71		
	Shipping Pred			8	11	0.73	27	0.66
	Break Room	Lounge	15	50	43	0.68	27	0.66
	Womens Rm	Toilet	20	35	14	0.68	13	0.66
	Mens Rm	Toilet	20	35	17	.68/.82*	14	.50/.66*
	Mens Showers	Toilet	20	3				
	Storage Rm	Storage	5	13	15	0.68	14	0.66
	Office	Office	50	42	34	0.68	31	0.66

* Multiple Fixtures Used

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present Avg Calc FC	Present LLF	Proposed Avg Calc FC	Proposed LLF
63-100	Office 1	Office	50	45	83	.68/.69*	58	0.66
	Womens Rm	Toilet	20	37	36	0.68	33	0.66
	Office 2	Office	50	72	56	0.68	36	0.81
	Mask-SuitDist			32	51	0.68	30	0.66
	Training Rm			29				
	Hall 1	Corridor	10	45	61	0.68	15	0.66
	Mens Rm	Toilet	20	47	27	0.68	13	0.66
	Change Rm	Toilet	20	37	44	0.68	40	0.66
	Hall 2	Corridor	10	20	47	0.68	17	0.66
	Break Rm	Lounge	15	18	30	0.69	25	0.66
	Storage Area	Storage	5	47	30	0.69	25	0.66
	Clean Rm			112	94	.67/.69*	70	0.66

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present Avg Calc FC	Present LLF	Proposed Avg Calc FC	Proposed LLF
63-110	Layout 1			37	45	0.68	31	.70/.74*
	Layout 2			62	42	0.67	21	0.69
	Testing			40				
	Bonding			47	51	0.68	48	0.7
	Storage A	Storage	5	58	59	0.68	15	0.7
	Smoke Break	Lounge	15	39	74	0.68	37	0.74
	Break Rm	Lounge	15	49	45	0.68	22	0.74
	2 Bathrooms	Toilets	20	20	21	0.68	18	0.7
	Storage B	Storage	5	48	42	0.68	21	0.7
	Office	Office	50	89	72	0.68	46	0.74

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present Avg Calc FC	Present LLF	Proposed Avg Calc FC	Proposed LLF
63-120	LoadingArea 1			10	14	.53/.69*	14	.53/.69*
	Restroom 1	Toilet	20	30	25	0.68	22	0.66
	Restrm2/Chng	Toilet	20	80				
	Machine Shp			30				
	Radioacive stg			56	69	0.68	24	0.66
	Office	Office	50	30	54	0.68	37	0.66
	ToolRm Office	Office	50		15	0.68	15	0.73
	Break Rm	Lounge	15	42	40	0.68	24	0.66

* Multiple Fixtures Used

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
63-200	Main Area	Office	50	112	40	0.68	44	.67/.69*
	Break Rm	Lounge	15	34	55	0.68	33	0.66
	Mens Rm	Toilet	20	44				
	Womens Rm	Toilet	20	44				
	Mask Insp			48				
	Storage Rm	Storage	5	20	38	0.68	36	0.66
	Office 1	Office	50	35	31	0.68	30	0.66
	Office 2	Office	50	49	37	0.68	35	0.66
	Tool Rm			43				

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
63-210	Main Area	Office	50	122	59	0.69	44	0.66
	M43 Test Prep			40	53	0.68	48	0.66
	Storage Rms	Storage	5	31	15	0.69	15	0.66
	Drying Rm				4	0.76		
	Break Rm	Lounge	15	48	28	.68/.76*	26	.66/.76*
	Office1	Office	50	45	35	0.68	32	0.66

* Multiple Fixtures Used

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
63-410	Entrance				5	0.68	11	0.72
	Alcove			13	7	0.68	13	0.72
	Locker Rm 1	Toilet	20	40	23	.60/.68*	22	.60/.72*
	Shower 1	Toilet	20	14	14	0.68	13	0.67
	Locker Rm 2	Toilet	20	26	16	.60/.68*	15	.60/.72*
	Alcove 2			20				
	Rest Rm 1	Toilet	20	30	23	.60/.68*	14	.60/.66*
	Shower 2	Toilet	20	14	15	0.68	14	0.69
	Alcove 3			6				
	Alcove 4			6	7	0.62		
	Alcove 5			5	8	0.62		
	Alcove 6			9	8	0.68		
	Open Ape			28	9	.60/.68*	12	.60/.67*
	Rest Rm 2	Toilet	20	26	9	.60/.68*	12	.60/.67*
	Alcove 7			26	16	0.68	14	0.72
	Hallway 1	Corridor	10	18	10	0.68	9	0.67
	Office 1	Office	50	23	22	.60/.68*	38	.60/.66*
	Kitchen	Kitchen	70	25	22	.60/.68*	38	.60/.66*
	Break Rm	Lounge	15	22	20	0.68	26	0.66
	Office 3	Office	50	22	8	0.68	33	0.66
	Office 4	Office	50	35	8	0.68	33	0.66
	Rest Rm 3	Toilet	20	32	18	.60/.62/.68*	17	.60/.62/.72*
	Alcove 8			7				
	Hallway 2	Corridor	10	20	10	.62/.68*	9	.62/.67*
	Rest Rm 4	Toilet	20	20	10	.60/.68*	18	.60/.72*
	Alcove(WRR)			10	9	0.62		
	Entrance 2			15	4	0.68	9	0.67
	Alcove 9				7	0.62		
	Lutance Room			35	19	.60/.68*	19	.60/.72*
	Showers	Toilet	20	15	12	.62/.68*	11	.62/.67*
	Alcove 10			5	9	0.62		
	Open Area 2			32	17	0.68	15	0.72
	Rest Rm 5	Toilet	20	33	20	0.68	17	.58/.72*
	Alcove 11			7				
	WmnsLckr Rm	Toilet	20	21	18	.60/.68*	17	.58/.72*
	Wmns Showrs	Toilet	20	13	13	0.68	12	0.66
	Rest Rm 6	Toilet	20	17	19	.60/.68*	17	.58/.72*
	Alcove 12				10	0.68	10	0.72
	Alcove 13				8	0.62		
	Ice Mach Rm			25	8	.62/.68*	18	.62/.72*
	Clthng Issue			24	12	0.68	27	0.72
	Mask Storage	Storage		14	22	0.68	21	0.72

7.0 BUILDING FIXTURE CHANGEOUT DATA

The following tables summarize the fixture changes by room in each building. The tables are divided into two sections; (1) fixtures removed and installed; and (2) fixtures upgraded. General descriptions and numbers of the fixture types are included below each table; specifics of each fixture type are included with the detailed calculations in Volumes IIA-IIE.

The upgrade portion of the table shows the numbers of lamp and ballasts removed, the number of T8 lamps, electronic ballasts and reflectors installed, and the number of lampholders removed.

BLDG 10-020

Room	Remv Fixt.	Fixt. Type	Install Fixt.	Fixt. Type	Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	Rmv Hldrs.	T8 Lamps	Elect. Blsts.
223-9	0		0		12	4	B1	2	R2	12	48	24	24	24	12
Break	2		0		4	1	H3	2	H2		4	4	8	8	4
106	0		0		4	4	B1	2	WL	4	16	8	8	8	4
107	2		0		8	4	B1	2	R2	8	32	16	16	16	8
202	0		0		4	4	F	2	RR	4	16	8	8	8	4
206	0		0		6	4	B1	2	WL	6	24	12	12	12	6
288	1		0		6	4	B1	2	WL	6	24	12	12	12	6
Hall	4	M3	5	CF											
Vending	3	M4	2	I2											
101	4	M3	4	R2											
103	4	M3	4	R2											
205	7	M3	7	R2											
217	4	M3	4	R2											
265	4	M3	4	R2											
270	6	M3	3	R2											
289	2	A	1	SM											
Cashier	3	M3	1	W2											
215	6	M3	6	W2											
263	5	M3	2	W2											
290	18	M3	10	W2											
201-3	6	M3	5	WL											
213-16	7	M3	7	WL											
286B	3	M3	3	WL											
292A	4	M3	4	WL											
Cashier			2	WL											
100	4	M3	4	WL											
112	6	M3	4	WL											
115	6	M3	4	WL											
117	6	M3	4	WL											
207	4	M3	4	WL											
209	4	M3	4	WL											
221	4	M3	4	WL											
228	2	M3	2	WL											
231	2	M3	3	WL											
232	10	M3	10	WL											
263			3	WL											
266	8	M3	8	WL											
267	4	M3	4	WL											
269	6	M3	6	WL											
270			3	WL											
282	4	M3	4	WL											
284	2	M3	2	WL											
292	2	M3	2	WL											
Totals	169		149		44					40	164	84	88	88	44

164	M3		4L Turret Strip/ Eggcrate Louvers
3	M4		2L Turret Strip/ Eggcrate Louvers
2	A		2L Ceiling Mount Wraparound
	5	CF	Compact Fluorescent
	2	I2	2L Industrial
	26	R2	2L Wraparound w/ reflector
	1	SM	1L Surface Strip
	19	W2	2L Wraparound
	96	WL	2L Wraparound w/ reflector

BLDG 10-030

Room		Rmv Fixt.	Fixt. Type	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
Toilets		2	G2	2	M8												
Open Office							8	4	P4	4	P8		32	16	0	32	8
Janitor		1	R1				1	2	R1	1	R		2	1	2	1	1
S. Foyer							1	4	R4	1	R		4	2	2	1	1
Computer							1	4	R4	3	R3		4	2	2	3	1
Off. 2 & 3							4	4	P4	3	R3		16	8	8	12	4
Off. 4 & 5							4	4	P4	3	R3		16	8	8	12	4
Office 6							2	4	P4	3	R3		8	4	4	6	2
Office 8							2	4	P4	3	R3		8	4	4	6	2
Break							2	2	R2	2	R8		4	2	0	4	2
E. Hall							2	2	R2	2	R8		4	2	0	4	2
Hall							4	4	P4	2	R8		16	8	8	8	4
Hall/Off							3	2	R2	2	R8		6	3	0	6	3
Storage							1	2	R2	2	R8		2	1	0	2	1
Storage							1	4	P4	2	R8		4	2	2	2	1
Conf.							2	4	R4	2	RR	2	8	4	4	4	2
File Rm							4	4	P4	2	RR	4	16	8	8	8	4
Hall/Off							2	4	P4	2	RR	2	8	4	4	4	2
Office 1							2	4	P4	2	RR	2	8	4	4	4	2
Office 7							3	2	P2	2	RR	3	6	3	6	6	3
Open Off 2							8	4	R4	2	RR	8	32	16	16	16	8
Toilets							6	2	SM	1	S1		12	6	12	6	6
E. Ent.							1	2	S2	2	S8		2	1	0	2	1
Entrance							2	2	S2	2	S8		4	2	0	4	2
Hall		1	S2				1	2	S2	2	S8		2	1	0	2	1
Totals		4		2			67					21	224	112	94	155	67

2	G2		2L Wet Location
1	R1		1X4 2L Troffer
1	S2		2X2 2L troffer
		2 M8	1X4 2L Surface Strip

BLDG 10-050

Room		Rmv Fixt.	Fixt. Type	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
Entrance		2	L4				2	4	L4	2	LR	2	8	4	4	4	2
Office 1							4	4	L4	2	LR	4	16	8	8	8	4
Office 2							4	4	L4	2	LR	4	16	8	8	8	4
Hallway 1							5	2	R2	2	L8		10	5	0	10	5
Hallway 2							4	2	R2	2	L8		8	4	0	8	4
Kitchen							5	2	L2	2	LR	5	10	5	0	10	5
Lounge							4	2	R2	2	L8		8	4	0	8	4
Exercise Rm.							6	2	R2	2	L8		12	6	0	12	6
Laundry							2	2	R2	2	L8		4	2	0	4	2
Toilet/Shwr		4	L2	4	W8												
Sleeping							3	2	R2	2	L8		6	3	0	6	3
TV Room							4	4	L4	2	L8		16	8	8	8	4
Office 3							2	4	L4	2	LR	2	8	4	4	4	2
Women's RR							1	4	L4	2	L8		4	2	2	2	1
Totals		6		4			46					17	126	63	34	92	46

2	L4		2X4 4L Troffer
4	L2		1X4 2L Wraparound
		4 W8	2L Ceiling Mounted Wraparound

BLDG 13-010

Room		Remove Fixt.	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
Admin Offices						20	4	L4	2	LR	2	80	40	40	40	20
Training						4	4	L4	2	L8		16	8	8	8	4
Hallway						4	2	L2	2	L8		8	4	0	8	4
Totals		0	0			28					2	104	52	48	56	28

BLDG 13-020

Room		Remov Fixt.		Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
Waiting							4	2	A1	2	A8		8	4	0	8	4
Entrance							2	2	M4	2	S8		4	2	0	4	2
Reception							3	2	M4	2	S8		6	3	0	6	3
Records							4	2	M4	2	S8		8	4	0	8	4
Office 1							4	2	M4	2	SR	4	8	4	0	8	4
Dr. Office		3	M4	4	BR								0	0	0	0	0
Dr. Office		1	B1														
Exam Room							2	2	M4	2	SR	2	4	2	0	4	2
Patient Lobby							1	2	T	2	T8		2	1	0	2	1
Hallway 1		1	M3	1	T8								0	0	0	0	0
Hallway 1		1	T2														
Hallway 1		2	X5	2	GC								0	0	0	0	0
X-Ray Room							2	4	T2	2	TR	2	8	4	2	4	2
X-Ray Tech		1	M3	1	BR								0	0	1	0	0
X-Ray Wait		1	M3	1	BR								0	0	1	0	0
Records							2	2	M4	2	S8		4	2	0	4	2
Hallway 2		2	M3	2	A8								0	0	2	0	0
Scrub Room							2	4	T2	2	TR	2	8	4	2	4	2
Emergency							4	4	T2	4	T4		16	8	0	16	4
Med. Storage							3	4	T2	2	TR	3	12	6	3	6	3
ER Entrance							1	2	J	2	J8		2	1	0	2	1
Totals		12		11			34					13	90	45	11	76	34

5	M3			4L Strip/ Eggcrate Louvers
2	X5			75W Incandescent
1	T2			4L surface mount
1	B1			4L Wraparound
3	M4			2L Surface Strip
		6	BR	4' Wraparound w/ reflector
		1	T8	2X4 2L Surface Mount w/ Acrylic Lens
		2	GC	20w Compact quad
		2	A8	2L Ceiling Mount Wraparound

BLDG 13-030

Room		Remove Fixt.	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
Operations						3	4	T2	2	TR	3	12	6	6	6	3
Clerk						1	4	T2	4	T4		4	2	0	4	1
Commander						1	4	T2	4	T4		4	2	0	4	1
Security						1	2	T	2	T8		2	1	0	2	1
Supervisor						1	4	T2	4	T4		4	2	0	4	1
Publications						1	4	T2	4	T4		4	2	0	4	1
Latrine						1	2	T	2	T8		2	1	0	2	1
Equipment						1	2	T	2	T8		2	1	0	2	1
Laundry						1	2	T	2	T8		2	1	0	2	1
Maintenance						1	4	T2	4	T4		4	2	0	4	1
Supply Sto.						1	2	T	2	T8		2	1	0	2	1
Supply Office						1	4	T2	4	T4		4	2	0	4	1
Dress Out Rm						1	2	T	2	TR	1	2	1	0	2	1
Classroom						3	4	T2	4	T4		12	6	0	12	3
Class Office						1	4	T2	4	T4		4	2	0	4	1
Kitchen						2	4	T2	4	T4		8	4	0	8	2
Work room						1	2	T	2	TR	1	2	1	0	2	1
Tool Room						1	2	T	2	T8		2	1	0	2	1
Hallway						2	4	T2	2	TR	2	8	4	~~84~~	4	2
Totals		0	0			25					7	84	42	810	74	25

BLDG 13-040

Room		Remov Fixt.		Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
Room 1							2	2	A1	2	A8		4	2	0	4	2
Room 2							2	2	A1	2	A8		4	2	0	4	2
Room 3							4	2	P2	2	P8		8	4	0	8	4
Room 4							2	2	P2	2	P8		4	2	0	4	2
Room 5							2	2	P2	2	P8		4	2	0	4	2
Room 6							3	2	P2	2	P8		6	3	0	6	3
Room 7		1	X2	1	CF		2	2	P2	2	P8		4	2	0	4	2
Room 8							3	2	P2	2	P8		6	3	0	6	3
Room 9		1	P2				2	2	P2	2	P8		4	2	0	4	2
Men's Toilet							1	2	P2	2	P8		2	1	0	2	1
Women's Toilet							1	2	P2	2	P8		2	1	0	2	1
Hallway		3	P2				2	2	P2	2	P8		4	2	0	4	2
Totals		5		1			26					0	52	26	0	52	26

1	X2	75W Incandescent
4	P2	2X4 2L Troffer
1	CF	20 w Compact Fluorescent

BLDG 13-060

Room		Remove Fixt.	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
Supervisor						2	4	F	2	FR	2	8	4	4	4	2
Eye Exam						3	4	F	2	FR	3	12	6	6	6	3
Toilet						1	4	F	2	F2		4	2	2	2	1
Store Rm 1						1	4	F	2	F2		4	2	2	2	1
Office 1						3	4	F	2	F2		12	6	6	6	3
Reception						3	4	F	2	F2		12	6	6	6	3
Office 2						2	4	F	2	F2		8	4	4	4	2
Hallway		3				2	4	F	2	F2		8	4	4	4	2
Totals		3	0			17					5	68	34	34	34	17

BLDG 13-080

Room		Remov Fixt.		Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
Lab 1		5	M3	7	BR								0	0	0	0	0
		2	XX														
Lab 2		3	M3	3	BR								0	0	0	0	0
Urinalysis		2	M3	2	BT								0	0	0	0	0
Vinl-Punct.							2	4	B1	4	B4		8	4	0	8	2
Office		2	M3	2	BT								0	0	0	0	0
Toilets		6	XY	6	CF								0	0	0	0	0
Hallway		1	XY	1	CF								0	0	0	0	0
Totals		21		21			2					0	8	4	0	8	2

11	M3		4L Eggcrate Louvers
2	XX		100 W Incandescent
7	XY		75 W Incandescent
		10 BR	4' 2L Acrylic Wraparound w/ Reflector
		4 BT	4' 2L Acrylic Wraparound w/ Reflector
		7 CF	~~18~~ 20 W Quad Compact Fluorescent

BLDG 13-100

Room		Remove Fixt.	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
Waiting						6	2	A2	2	A8		12	6	0	12	6
Pharmacy						2	4	B2	4	B8		8	4	0	8	2
Phar. Office						1	4	B2	4	B8		4	2	0	4	1
Storage						1	4	B2	2	A8		4	2	2	2	1
Hallway						3	2	A2	2	A8		6	3	0	6	3
Storage 2		2	2	A8		1	2	A2	2	A8		2	1	0	2	1
Mechanical						1	2	A2	2	A8		2	1	0	2	1
Totals		2	2			15					0	38	19	2	36	15

2 A8 4' Acrylic Lens Wraparound

BLDG 13-110

Room		Remove Fixt.	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
Admin. Area		1	1	CF		5	4	L4	4	L5		20	10	0	20	5
Admin. Area		4				8	4	L4	2	L8		32	16	16	16	8
Admin. Area						16	2	L2	2	L8		32	16	0	32	16
Totals		5	1			29					0	84	42	16	68	29

1 CF ~~48~~ 20 W Quad Compact Fluorescent

BLDGS 16-210, 16-220

Room		Remov Fixt.		Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
Hallway		2	G				8	2	G	2	R2		16	8	0	16	8
Hallway		2	G2				2	1	G1	1	R1		2	2	0	2	2
Kitchen							4	2	A1	2	A8		8	4	0	8	4
Latrine 1							2	2	A1	2	A8		4	2	0	4	2
Laundry		2	X1	2	CF		4	1	A2	1	A7		4	4	0	4	4
Shower							2	2	A1	2	A8		4	2	0	4	2
Hallway		10	G	4	R2		4	1	G1	1	R1		4	4	0	4	4
Latrine 2							2	1	A2	1	A7		2	2	0	2	2
Latrine 2							2	2	A1	2	A8		4	2	0	4	2
Totals		16		6			30					0	48	30	0	48	30

12	G			2X4 2L Troffer
2	G2			2X2 2L Troffer
2	X1			150 w Incandescent Fixture
		2	CF	2L Surface Round Down Light, Compact Fl.
		4	R2	2X4 2L Static Grid Troffer, Acrylic Lens

BLDG 31-010

Room		Remove Fixt.	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
Laboratory						6	4	A	4	A8		24	12	0	24	6
Totals		0	0			6					0	24	12	0	24	6

BLDG 31-080

Room		Remove Fixt.	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
Foyer						1	2	L2	2	W8		2	1	0	2	1
Foyer						1	4	L4	2	R2		4	2	2	2	1
Breakroom						2	4	L4	2	R2		8	4	4	4	2
Toilets						2	2	L2	2	W8		4	2	0	4	2
TMDE Shop						2	4	L4	4	L8		8	4	0	8	2
Laboratory						8	4	L4	4	L8		32	16	0	32	8
Laboratory						2	4	L4	2	R2		8	4	4	4	2
Office						2	4	L4	2	R2		8	4	4	4	2
Computer						2	4	L4	2	R2		8	4	4	4	2
Radiac Room						2	4	L4	2	R2		8	4	4	4	2
Totals		0	0			24					0	90	45	22	68	24

BLDG 32-030

Room		Remove Fixt.	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
Office						4	2	B	2	B8		8	4	0	8	4
Garage		15	22	I8												
Totals		15	22			4					0	8	4	0	8	4

22 I8 8' 2L Industrial

BLDG 32-035

Room		Remove Fixt.	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
Motor Pool						252	2	L2	2	L8		504	252	0	504	252
Totals		0	0			252					0	504	252	0	504	252

BLDGS 32-060, 33-060

Room		Remove Fixt.	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
Compressor						12	2	A1	2	A8		24	12	0	24	12
Boiler Room						6	3	B1	3	B8		18	9 /2	0	18	6
Totals		0	0			18					0	42	21 /2	0	42	18

BLDG 32-070

Room		Remove Fixt.	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
Laundry						53	2	A	2	A8		106	53	0	106	53
Folding						43	2	A	2	A8		86	43	0	86	43
Break Room		1 A				2	2	A	2	A8		4	2	0	4	2
Toilets						2	2	A	2	A8		4	2	0	4	2
Office						3	4	C	4	C8		12	6	0	12	3
Totals		1	0			103					0	212	106	0	212	103

BLDG 32-090

Room		Remove Fixt.	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
Office 1						4	4	B	2	BR	4	16	8	8	8	4
Hallway						1	4	A	2	A2		4	2	2	2	1
Hallway 2						1	4	A	2	A2		4	2	2	2	1
Restrooms						2	4	A	2	A2		8	4	4	4	2
Office 2						15	4	A	2	A2		60	30	30	30	15
Office 3						1	4	A	4	A4		4	2	0	4	1
File Room						2	4	A	2	BR	2	8	4	4	4	2
Office 4						6	4	A	2	BR	6	24	12	12	12	6
Office 5						4	4	A	2	BR	4	16	8	8	8	4
Office 6						8	4	A	2	BR	8	32	16	16	16	8
Breakroom						8	4	A	2	A2		32	16	16	16	8
Conference						6	4	C	2	W2		24	12	12	12	6
Men's Room						2	4	A	2	A2		8	4	4	4	2
Totals		0	0			60					24	240	120	118	122	60

BLDG 32-100

Room		Remove Fixt.	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
Office 1						6	4	A1	3	A3		24	12	12	18	6
Office 2						3	4	A1	2	AR	3	12	6	6	6	3
Break Room						3	4	A1	2	A8		12	6	6	6	3
Men's Toilet						1	2	B1	2	BT		2	1	0	2	1
Men's Toilet						2	2	B2	2	BS		4	2	0	4	2
Women's Toilet						1	2	B1	2	BT		2	1	0	2	1
Women's Toilet						1	2	B2	2	BS		2	1	0	2	1
Entrance						3	2	C	2	C8		6	3	0	6	3
Storage 1						4	2	D	2	D8		8	4	0	8	4
Laboratory						3	2	C	2	C8		6	3	0	6	3
Laboratory						42	4	A2	2	S2		168	84	84	84	42
Lab Hallway		3 A2				2	4	A2	2	S2		8	4	4	4	2
Elect. Test						3	4	A2	4	A4		12	6	0	12	3
Storage 2						3	2	D	2	D8		6	3	0	6	3
Training						6	4	A1	2	A8		24	12	12	12	6
Rebuild Shop						8	2	E1	2	E8		16	8	0	16	8
Rebuild Shop						11	4	G1	2	E8		44	22	22	22	11
Rebuild Shop						12	2	F1	2	F8		24	12	0	24	12
Rebuild Shop						21	4	G1	2	E8		84	42	42	42	21
Totals		3	0			135					3	464	232	188	282	135

BLDG 32-130

Room		Remov Fixt.		Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
Laboratory							21	4	A1	2	AR	21	84	42	42	42	21
Sub Lab							17	4	A1	2	AR	17	68	34	34	34	17
Restroom		2	B2	2	CF								0	0	0	0	0
Storage		1	C1				1	2	C1	2	C8		2	1	0	2	1
Testing							10	4	A1	2	AR	10	40	20	20	20	10
Totals		3		2			49					48	194	97	96	98	49

2	B2		100W Incandescents
1	C1		2L Wraparound
		2 CF	28w Screw-in Compact fluorescent

BLDG 32-150

Room		Remove Fixt.	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
Office 1						4	2	A1	2	A8		8	4	0	8	4
Office 2						4	2	A1	2	A8		8	4	0	8	4
Office 3						4	2	A1	2	A8		8	4	0	8	4
Office 4						4	2	A1	2	A8		8	4	0	8	4
Office 5						4	2	A1	2	AR	4	8	4	0	8	4
Restroom 1						1	2	A1	2	A8		2	1	0	2	1
Restroom 2						1	2	A1	2	A8		2	1	0	2	1
Restroom 3						2	2	A1	2	A8		4	2	0	4	2
Totals		0	0			24					4	48	24	0	48	24

BLDG 33-530

Room		Remove Fixt.	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
North End		41	28	I4								0	0	0	0	0
South End		30	30	I4								0	0	0	0	0
NE Corner		12	15	I4								0	0	0	0	0
Totals		83	73			0					0	0	0	0	0	0

73 I4 1X4 2L Industrial

BLDG 34-110

Room		Remove Fixt.	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
WP Packing						113	2	A1	2	A8		226	113	0	226	113
WP Packing						4	4	B1	2	A8		16	8	8	8	4
Paint Shop						10	2	C1	2	C8		20	10	0	20	10
Packing Office						6	4	E	2	A8		24	12	12	12	6
Prep Room						40	2	A1	2	A8		80	40	0	80	40
Production Lin						46	2	A1	2	A8		92	46	0	92	46
Filling						360	2	A1	2	A8		720	360	0	720	360
Filling						6	4	E	2	A8		24	12	12	12	6
Office						4	4	F	2	A8		16	8	8	8	4
Totals		0	0			589					0	1218	609	40	1178	589

BLDG 34-120

Room		Remove Fixt.	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
Office 1						8	3	R2	2	RR	8	24	16	16	16	8
Office 2						2	3	R2	2	RR	2	6	4	4	4	2
Hallway		3 M1	2	I2								0	0	0	0	0
Office 4		15 M1	16	I2								0	0	0	0	0
Storage		14 M1	3	I2								0	0	0	0	0
Break Room		1 R3				2	2	R3	2	R8		4	2	0	4	2
Toilets/Foyer						2	1	B	1	B8		2	2	0	2	2
Toilets/Foyer						3	2	R3	2	R8		6	3	0	6	3
Laboratory						16	3	A1	3	A8		48	32	0	48	16
Office 3						4	3	R1	2	RR	4	12	8	8	8	4
Office 4		3 M1				3	3	R2	2	R8		9	6	6	6	3
Totals		36	21			40					14	111	73	34	94	40

21 I2 1X4 2L Industrial

BLDG 34-140

Room	Remove Fixt.	Install Fixt.	Fixt. Type	Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
Office				2	2	A1	2	A8		4	2	0	4	2
Water Test	2	1	A8							0	0	0	0	0
Boiler	2	2	C8	6	2	C	2	C8		12	6	0	12	6
Boiler	4	4	CF											
Restroom				2	2	C	2	C8		4	2	0	4	2
Compressor 1	4	4	A8							0	0	0	0	0
Compressor 2	4	4	A8							0	0	0	0	0
Totals	16	15		10					0	20	10	0	20	10

9 A8 1X8 2L Industrial
2 C8 1X4 2L Industrial
4 CF 28W Screw-in Compact Fluorescent
Replaces 100W Incandescent

34410
BLDG 34-149

Room	Remove Fixt.	Install Fixt.	Fixt. Type	Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	Rmv. Hldrs.	T8 Lamps	Elect. Blsts.
Change Rm 2				15	2	A	2	A8		30	15	0	30	15
Change Rm 1				7	2	A	2	A8		14	7	0	14	7
Paint Shop	8	8	MH							0	0	0	0	0
Sign Shop	22	18	I8							0	0	0	0	0
Entomology	2	8	I8							0	0	0	0	0
Paint Office	4	4	I8							0	0	0	0	0
Toilet 2				8	2	A	2	A8		16	8	0	16	8
Toilet 1				4	2	A	2	A8		8	4	0	8	4
PM Conf.				4	4	F	2	G8		16	8	16	8	4
PM Hall	1			1	4	F	2	G8		4	2	4	2	1
PM Office 1				4	4	F	2	G8		16	8	16	8	4
PM Office 2				4	4	F	2	G8		16	8	16	8	4
PM Office 3				4	4	F	2	G8		16	8	16	8	4
WO Central				8	4	B	4	B8		24	12	0	24	8
WO Central Ad				2	4	B	4	B8		8	4	0	8	2
WO Offices 1,2				4	2	G	2	G8		8	4	0	8	4
WO Hall				1	2	A	2	A8		2	1	0	2	1
WO Office 3				4	2	G	2	G8		8	4	0	8	4
WO Copy				2	4	F	2	G8		8	4	8	4	2
WO Break	2			4	4	F	2	G8		16	8	16	8	4
WO Secretary				8	4	F	2	G8		32	16	32	16	8
WO Sec. Alcove				2	4	F	2	G8		8	4	8	4	2
WO Microfiche	2			4	2	G	2	G8		8	4	0	8	4
Microf. Storage	1			1	2	G	2	G8		2	1	0	2	1
Util. Break	2			2	4	B	2	A8		8	4	8	4	2
Util. Kitchen	2	1	A8							0	0	0	0	0
Util. Office	2	2	A8							0	0	0	0	0
Women Change				8	2	A	2	A8		16	8	0	16	8
Hall/Change 1	1	2	I1							0	0	0	0	0
Grnds/Maint.	1	1	A8	3	4	B	2	A8		12	8	12	8	3
Refrig. Shop				9	4	M	2	M8		36	18	36	18	9
Refrig. Hall	3	1	M8	2	4	M	2	M8		8	4	8	4	2
Elec. Shop Brk.	3	3	L8	3	2	L1	2	L8		6	3	0	6	3
El Shop Hall 1				1	3	L2	2	L8		3	2	2	2	1
El Shop Hall 2	1			1	2	L1	2	L8		2	1	0	2	1
El Shop Work				4	2	L1	2	L8		8	4	0	8	4
Elec Office 1	2	2	L8	2	2	L1	2	L8		4	2	0	4	2
Elec Parts	2	2	L8							0	0	0	0	0
Locksmith	1			2	3	L4	2	L8		6	4	4	4	2
Locksmith				3	4	L	2	LR	3	12	6	12	6	3
Locksmith				2	2	L3	2	LR	2	4	2	0	4	2
Inst. Shop Brk		1	L8	3	4	L	2	L8		12	6	12	6	3
Inst Entrance		1	L8	3	4	L	2	L8		12	6	12	6	3
Inst Shop Office				4	4	F	2	G8		16	8	16	8	4
Wash Area				2	4	L	2	L8		8	4	8	4	2
Millwright Ent. 1	2			3	2	C3	2	C8		6	3	0	6	3
Inst Shop Work		1	LR	3	4	L	2	LR	3	12	6	12	6	3
Millwright Ent. 2				2	4	C	2	C8		8	4	8	4	2
Millwright Office				4	4	L	2	L8		16	8	16	8	4
Millwright Stor				3	4	L	2	L8		12	6	12	6	3
Millwright Shop	3	3	L8	11	4	L	2	L8		44	22	44	22	11
Millwright Shop	2	5	L8	3	4	L	2	L8		12	6	12	6	3
Tool/Die Lunch				12	4	F	2	G8		48	24	48	24	12
Tool & Die 1				47	4	C	2	C8		188	94	188	94	47
Tool & Die 2				67	4	C	2	C8		268	134	268	134	67
Tool & Die 3				50	4	C	2	C8		200	100	200	100	50
Tool & Die Sto	1	1	L8	2	4	C	2	C8		8	4	8	4	2
Tool & Die Sto				1	2	C1	2	C8		2	1	0	2	1
Tool & Die Sto				2	4	L	2	L8		8	4	8	4	2
Tool & Die Ofc	2			6	4	L	2	L8		24	12	24	12	6
Tool Room				3	4	B1	4	B8		12	6	0	12	3
Tool Room				14	2	C3	2	C8		28	14	0	28	14
Tool Hallway				2	4	C	2	C8		8	4	8	4	2
BGU Work Area	4	6	AR							0	0	0	0	0
BGU Break	1			2	4	B1	2	A8		8	4	8	4	2
BGU Office 1	2	4	AR							0	0	0	0	0
BGU Office 2	4	4	AR							0	0	0	0	0
BGU Entrance				1	4	L	2	L8		4	2	4	2	1
BGU Kitchen	2	2	A8							0	0	0	0	0
Sheet Metal	3	3	L8	8	4	C	2	C8		32	16	32	16	8
Sheet Metal				5	2	C1	2	C8		10	5	0	10	5
Storage Crib				18	2	C3	2	C8		36	18	0	36	18
Totals	88	81		412					8	1427	715	1162	848	412

8 MH 100 W Metal Halide
21 L8 1X4 2L Industrial
6 A8 1x4 2L Wraparond
14 AR 1x4 2L Wraparond w/ Reflector
2 I1 1x4 1L Industrial
1 M8 1x8 2L Industrial
28 I8 1X4 2L Industrial REFLECTOR
1 LR 1X4 2L Industrial w/ ~~Wraparound~~

BLDG 34-970

Room		Remv Fixt.	Fixt. Type	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
Secretary		1	F				3	4	F	2	G8		12	6	6	6	3
Admin Office							4	4	F	2	G8		16	8	8	8	4
Admin 4		1	F				3	4	F	2	G8		12	6	6	6	3
Admin 3							4	4	F	2	G8		16	8	8	8	4
Director		4	G				4	2	G	2	G8		8	4	0	8	4
Conf. Room		1	F				4	4	F	2	G8		16	8	8	8	4
File Room		1	F				1	4	F	2	G8		4	2	2	2	1
Copier room		2	M3	2	W8								0	0	0	0	0
Women's Lounge							1	4	B	2	W8		4	2	2	2	1
Restrooms		2	X2	2	CF								0	0	0	0	0
Alcove							1	2	G	2	G8		2	1	0	2	1
Kitchen							1	2	G	2	G8		2	1	0	2	1
Hallway							2	2	G	2	G8		4	2	0	4	2
Totals		12		4			28					0	96	48	40	56	28

2 W8 4' 2L Wraparound
2 CF Compact Fluorescent replaces 75W Incamd. Screw-in

Room	Remv. Fixt.	Fixt. Type	Install Fixt.	Fixt. Type	Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	Rmv. Hldrs.	T8 Lamps	Elect. Blsts.
Cafeteria	10	F1			54	3	F1	2	F8		162	108	108	108	54
Cafeteria					3	3	F2	2	F8		9	6	6	6	3
Cafeteria Office	2	F			6	4	F	2	F8		24	12	24	12	6
Cafeteria Conf	2	F			2	4	F	2	F8		8	4	8	4	2
Cafeteria Office	1	F1			3	4	F	2	F8		12	6	12	6	3
Hall & Toilets	5	X	5	CF							0	0	0	0	0
Engr./PM Offices					2	4	F	2	FR	2	8	4	8	4	2
PM Admin Area					9	4	F	2	F8		36	18	36	18	9
PM Director					4	4	F	2	F8		16	8	16	8	4
Coffee Room					2	4	F	2	F8		8	4	8	4	2
CADD Office					2	4	F	2	F8		8	4	8	4	2
Office 1					3	4	F	2	FR	3	12	6	12	6	3
Office 2					4	4	F	2	F8		16	8	16	8	4
Office Hall					2	4	F	2	F8		8	4	8	4	2
Main Hall	1	X	1	CF	7	2	G	2	F8		14	7	0	14	7
Main Toilets	2	X	2	CF							0	0	0	0	0
Office 3					5	4	F	2	F8		20	10	20	10	5
Men's New LR					13	2	G	2	F8		26	13	0	26	13
LR Alcove					1	2	G	2	F8		2	1	0	2	1
Men's New Shwr	1	G			4	2	G	2	F8		8	4	0	8	4
Men's New Shwr					2	2	W1	2	W8		4	2	0	4	2
Men's Old LR					36	2	G	2	F8		72	36	0	72	36
Locker Hall	8	M4	4	W2							0	0	0	0	0
Locker Hall	1	X									0	0	0	0	0
Locker Toilets	8	M4	4	W2							0	0	0	0	0
Men's Old Shwr					4	2	J	2	J8		8	4	0	8	4
Women's LR	2	J			6	2	J	2	J8		12	6	0	12	6
Women Shwr 1	14	X1	5	J8							0	0	0	0	0
Women Shwr 2	10	X1	3	J8							0	0	0	0	0
Women Shwr 2			2	CF							0	0	0	0	0
Women's Lounge					4	2	G	2	F8		8	4	0	8	4
Lounge RR	3	M4	3	W2							0	0	0	0	0
Supply Storage					8	2	G	2	F8		16	8	0	16	8
Supply Filing					23	4	F	2	F8		92	46	92	46	23
Supply Office					2	4	F	2	F8		8	4	8	4	2
Supply Office					7	2	G	2	F8		14	7	0	14	7
Totals	70		29		218					5	631	344	390	436	218

11	W2	4' 2L Ceiling Mount Wraparound
10	CF	PS20 Screw-in Compact Fluorescent
8	J8	4' 2L Ceiling Mount Wraparound Wet Location

BLDG 51-420

Room		Remv. Fixt.	Fixt. Type	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	Rmv. Hldrs.	T8 Lamps	Elect. Blsts.
Room 34		3	F				3	4	F	2	F8		12	6	12	6	3
Room 35							4	4	F	2	F8		16	8	16	8	4
Room 33							4	4	F	2	F8		16	8	16	8	4
Room 31		2	F				4	4	F	2	F8		16	8	16	8	4
Room 29							4	4	F	2	F8		16	8	16	8	4
Room 32		2	J2				3	2	J2	2	J8		6	3	0	6	3
Room 32							1	2	W	2	W8		2	1	0	2	1
Room 30		1	J2				2	2	J2	2	J8		4	2	0	4	2
Room 30							1	2	W	2	W8		2	1	0	2	1
Room 27							4	4	F	2	F8		16	8	16	8	4
Room 21							4	4	F	2	F8		16	8	16	8	4
Room 25							4	4	F	2	F8		16	8	16	8	4
Room 22							4	4	F	2	F8		16	8	16	8	4
Room 23							4	4	F	2	F8		16	8	16	8	4
Room 20-24		1	F				3	4	F	2	F8		12	6	12	6	3
Room 26							4	4	F	2	F8		16	8	16	8	4
Room 28							4	4	F	2	F8		16	8	16	8	4
Men Toilet		2	F				2	4	F	2	F8		8	4	8	4	2
Women Toilet		1	F				1	4	F	2	F8		4	2	4	2	1
Women Toilet							1	2	L3	2	L8		2	1	0	2	1
Women Toilet							1	2	W	2	W8		2	1	0	2	1
Copier Room							2	3	L2	2	L8		6	4	4	4	2
Room 5							6	4	F	2	F8		24	12	24	12	6
Room 3		2	F				4	4	F	2	F8		16	8	16	8	4
Room 1							6	4	F	2	F8		24	12	24	12	6
Room 2							2	4	F	2	F8		8	4	8	4	2
Room 4		2	F				4	4	F	2	F8		16	8	16	8	4
Rooms 6,8,10							12	4	F	2	F8		48	24	48	24	12
Room 9							2	4	F	2	F8		8	4	8	4	2
Room 12							4	4	F	2	F8		16	8	16	8	4
Room 11							4	4	F	2	F8		16	8	16	8	4
Room 14							6	4	F	2	F8		24	12	24	12	6
Room 13							4	4	F	2	F8		16	8	16	8	4
Totals		16		0			118					0	452	227	432	236	118

BLDG 51-430

Room		Remv Fixt.	Fixt. Type	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
Office 1		1	F				8	4	F	2	F8		32	16	16	16	8
Office/Shop							8	2	H	2	H8		16	8	0	16	8
Restrooms		2	X2	2	CF								0	0	0	0	0
Conference		3	G				6	4	F	2	F8		24	12	12	12	6
Office 3							2	4	F	2	F8		8	4	4	4	2
Office 3							1	2	G	2	F8		2	1	0	2	1
Office 3 Toilet		2	X3	2	CF								0	0	0	0	0
Totals		8		4			25					0	82	41	32	50	25

1	F			2X4 4L Troffer
3	G			2X4 2L Troffer
2	X2			75W Incandescent
2	X3			60W Incandescent
		4	CF	PS20 Screw-in Compact Fluorescent

BLDG 53-160

Room		Remv Fixt.	Fixt. Type	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
Main Admin							16	4	F	2	F2		64	32	32	32	16
Break Room							9	2	G	2	F2		18	9	0	18	9
Women's Change		4	X_	4	CF		2	4	F	2	F2		8	4	4	4	2
Women's Change							4	2	G1	2	G8		8	4	0	8	4
Women's Change							1	2	Y	2	W8		2	1	0	2	1
Office 3							4	4	F	2	FR	4	16	8	8	8	4
Store Room							2	4	F	2	F2		8	4	4	4	2
Men's Change		1	X_	1	CF		9	4	F	2	F2		36	18	18	18	9
Men's Change							1	2	G1	2	G8		2	1	0	2	1
Men's Change							2	2	Y	2	W8		4	2	0	4	2
Restrooms							2	2	G1	2	G8		4	2	0	4	2
Restrooms							2	2	Y	2	W8		4	2	0	4	2
Hallway							1	4	F	2	F2		4	2	2	2	1
Totals		5		5			55					4	178	89	68	110	55

4 X_ Incandescent Lamps

5 CF PS23 Compact Fluorescent Screw-in Lamps

BLDG 60-020

Room		Remv Fixt.	Fixt. Type	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
Provost Marshall		4	M3,5	4	W8								0	0	0	0	0
Security Spec.		4	M3,5	4	W8								0	0	0	0	0
Room 103		2	M3	2	W4								0	0	0	0	0
Room 105							4	2	A1	2	WR	4	8	4	0	8	4
Room 105A		2	M5	2	WR								0	0	0	0	0
Room 107		2	M5	2	WR								0	0	0	0	0
Room 102		4	M5	2	WR								0	0	0	0	0
Room 104		2	M3,5	2	WR								0	0	0	0	0
Break Room		2	M5	2	W8								0	0	0	0	0
Toilets		1	J	1	W8		1	2	A1	2	W8		2	1	0	2	1
Hallway							9	4	B1	2	W8		36	18	18	18	9
Training							4	2	G	2	G8		8	4	0	8	4
Locker Room 1							2	4	F	2	G8		8	4	4	4	2
Foyer							1	2	G	2	G8		2	1	0	2	1
Room 109		3	M3	3	WR								0	0	0	0	0
Room 110							2	4	F	3	F3		8	4	4	6	2
Radio Room							3	4	F	2	G8		12	6	6	6	3
Radio Room							1	2	G	2	G8		2	1	0	2	1
Locker Room 2							5	4	F	2	G8		20	10	10	10	5
Totals		26		24			32					4	106	53	42	66	32

25	M3,5		4' Surface strip, Eggcrate Louvers
1	J		4' Wraparound, Wet location
		11	WR 4' 2L Wraparound w/ Reflector
		2	W4 4' 4L Wraparound
		11	W8 4' 2L Wraparound

BLDG 60-060

Room		Remv Fixt.	Fixt. Type	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	New Hldrs.	T8 Lamps	Elect. Blsts.
Break Room							6	4	F	2	F2		24	12	12	12	6
Hallway							1	2	A1	2	W2		2	1	0	2	1
Mens Toilet		1	Y1	1	CF		1	4	F	2	F2		4	2	2	2	1
Womens Toilet							1	4	F	2	F2		4	2	2	2	1
Janitor		1	Y1	1	CF								0	0	0	0	0
Room 6							2	4	F	2	FR	2	8	4	4	4	2
Open Office							9	4	F	2	FR	9	36	18	18	18	9
Room 5							2	4	F	2	FR	2	8	4	4	4	2
Room 6A							2	4	F	2	FR	2	8	4	4	4	2
Storage							1	2	A1	2	W2		2	1	0	2	1
Room 3							4	4	F	2	FR	4	16	8	8	8	4
Open Area							9	4	F	2	FR	9	36	18	18	18	9
Room 2							3	4	F	2	FR	3	12	6	6	6	3
Room 1							4	4	F	2	FR	4	16	8	8	8	4
Entrance Hall		1	Y1	1	CF		1	2	A1	2	W2		2	1	0	2	1
Totals		3		3			46					35	178	89	86	92	46

3 Y1 Incandescent Lamps

3 CF PS20 Compact Fluorescent Lamps

BLDG 60-070

Room		Remv Fixt.	Fixt. Type	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	Remv Hldrs.	T8 Lamps	Elect. Blsts.
Cotton Storage		2	C										0	0	0	0	0
Cotton Storage		4	J	6	I8												
Offices		4	J	6	I8								0	0	0	0	0
Showers							4	2	J	2	J8		8	4	0	8	4
Mens Locker		2	J	2	I8								0	0	0	0	0
Hallway		2	J	2	I8								0	0	0	0	0
Mens Toilet		2	J	1	I8								0	0	0	0	0
Repair Station							1	4	C	4	C8		4	2	0	4	12
Repair Station							2	4	C2	2	C1		8	4	4	4	2
Repair Station							51	2	J	2	J8		102	51	0	102	51
Control Room							2	2	J	2	J8		4	2	0	4	2
Totals		16		17			60					0	126	63	4	122	8961

2	C			8' 4L Industrial
14	J			4' 2L Wraparound Wet Location
		17	I8	4' 2L Industrial

BLDG 60-090

Room		Remv Fixt.	Fixt. Type	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	Remv Hldrs.	T8 Lamps	Elect. Blsts.
Main Office		12	M3	12	IR								0	0	0	0	0
Office 2		3	M3	3	IR								0	0	0	0	0
Office 3		2	M3	2	IR								0	0	0	0	0
File Storage		7	M3	7	I8								0	0	0	0	0
Kitchen		2	M3	2	I8								0	0	0	0	0
Hall/Entrance		3	M3	2	I8								0	0	0	0	0
Womens Toilet		2	ZX	2	C4								0	0	0	0	0
Womens Toilet		1	ZY	1	CF								0	0	0	0	0
Mens Toilet		1	ZX	1	C4								0	0	0	0	0
Mens Toilet		1	ZY	1	CF								0	0	0	0	0
Totals		34		33			0					0	0	0	0	0	0

29	M3		4' 4L Turret Strip Eggcrate Louvers
3	ZX		2L Incandescent Fixtures, replace lamps
2	ZY		Incandescent Lamp
		17	IR 1X4 2L Industrial / Eggcrate Louvers / Reflectors
		11	I8 1X4 2L Industrial / Eggcrate Louvers
		3	C4 (2) PS15 Compact Lamps
		2	CF PS20 Compact Lamp

BLDG 60-630

Room		Remv Fixt.	Fixt. Type	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	Remv Hldrs.	T8 Lamps	Elect. Blsts.
Shipping		9	XP	15	H8								0	0	0	0	0
Break Room							2	4	F1	2	F8		8	4	4	4	2
Womens Toilet							2	2	J	2	H8		4	2	0	4	2
Mens Change		1	XQ	1	CQ		3	2	J	2	H8		6	3	0	6	3
Storage							1	2	J	2	H8		2	1	0	2	1
Office							3	2	J	2	H8		6	3	0	6	3
Totals		10		16			11					0	26	13	4	22	11

9	XP		Incandescent explosion proof fixtures
1	XQ		Incandescent Lamp
	15	H8	4' 2L Wraparound Damp location
	1	CQ	PS20 compact Fluorescent Screw-in

BLDG 63-100

Room		Remv Fixt.	Fixt. Type	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	Remv Hldrs.	T8 Lamps	Elect. Blsts.
Office 1							2	4	C4	2	C8		8	4	4	4	2
Office 1							4	2	L1	2	L8		8	4	0	8	4
Womens Toilet							2	2	L1	2	L8		4	2	0	4	2
Office 2							2	4	B	2	BR	2	8	4	4	4	2
M-S Distribution							29	4	F	2	F8		116	58	58	58	29
Hall 1		3	L1				1	2	L1	2	L8		2	1	0	2	1
Mens Toilet		1	L1				1	2	L1	2	L8		2	1	0	2	1
Change Room							4	2	L1	2	L8		8	4	0	8	4
Hall 2		5	L1				3	2	L1	2	L8		6	3	0	6	3
Clean Room		3	C2				27	2	C5	2	C8		54	27	0	54	27
Clean Room		2	C5										0	0	0	0	0
Storage/Break		2	C5				12	2	C5	2	C8		24	12	0	24	12
Totals		16		0			87					2	240	120	66	174	87

9	L1	4' 2L Industrial
3	C2	8' 4L Industrial
4	C5	8' 2L Industrial

BLDG 63-110

Room		Remv Fixt.	Fixt. Type	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	Remv Hldrs.	T8 Lamps	Elect. Blsts.
Layout 1							3	2	A1	2	A8		6	3	0	6	3
Layout 1							45	4	F	2	F8		180	90	90	90	45
Layout 2							9	4	C6	2	C8		36	18	18	18	9
Bonding							6	4	F	3	F3		24	12	12	18	6
Storage A		1	B1				1	4	B1	2	A8		4	2	2	2	1
Smoke Break		1	F				2	4	F	2	F8		8	4	4	4	2
Break Room		1	F				2	4	F	2	F8		8	4	4	4	2
Restrooms							1	2	A1	2	A8		2	1	0	2	1
Storage B		1	A1				1	2	A1	2	A8		2	1	0	2	1
Office							2	4	F	2	F8		8	4	4	4	2
Hallway							3	4	F	2	F8		12	6	6	6	3
Totals		4		0			75					0	290	145	140	156	75

1	B1	4' 4L wraparound
2	F	2X4 4L Troffer
1	A1	4' 2L Wraparound

BLDG 63-120

Room		Remv Fixt.	Fixt. Type	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	Remv Hldrs.	T8 Lamps	Elect. Blsts.
Loading Area 1							10	2	H	2	H8		20	10	0	20	10
Change Area		2	X5	2	CF		2	2	A	2	A8		4	2	0	4	2
Change Area							2	4	B	2	A8		8	4	4	4	2
R/A Storage		1	F				1	4	F	2	F8		4	2	2	2	1
Office							2	4	F	2	F8		8	4	4	4	2
Restroom							1	2	A	2	A8		2	1	0	2	1
Tool Room Ofc							1	2	L1	2	L8		2	1	0	2	1
Break Room							2	4	F	2	F8		8	4	4	4	2
Totals		3		2			21					0	56	28	14	42	21

2 X5 Incandescent Shower Light - Remove Lamps
1 F 2X4' 4L Troffer
2 CF PS 23 Compact Fluorescent lamp / SHOWER LIGHT

BLDG 63-200

Room		Remv Fixt.	Fixt. Type	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	Remv Hldrs.	T8 Lamps	Elect. Blsts.
Main Assembly							68	4	F	4	F8		272	136	0	272	68
Main Assembly							14	4	F	2	FR	14	56	28	28	28	14
Break Room							13	4	F	2	F2		52	26	26	26	13
Storage							3	2	G	2	F2		6	3	0	6	3
Office 1							2	2	G	2	F2		4	2	0	4	2
Office 2							4	2	G	2	F2		8	4	0	8	4
Totals		0		0			104					14	398	199	54	344	104

BLDG 63-210

Room		Remv Fixt.	Fixt. Type	Install Fixt.	Fixt. Type		Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	Remv Hldrs.	T8 Lamps	Elect. Blsts.
Main Work Area		15	C3				50	2	C3	2	C8		100	50	0	100	50
M43 Test							15	2	G	2	G8		30	15	0	30	15
Storage Rooms							3	2	C3	2	C8		6	3	0	6	3
Break Room							10	2	G	2	G8		20	10	0	20	10
Office/Tool Rm							7	2	G	2	G8		14	7	0	14	7
Totals		15		0			85					0	170	85	0	170	85

15 C3 8' 2L Industrial

BLDG 63-410

Room	Remv. Fixt.	Fixt. Type	Install Fixt.	Fixt. Type	Upgrade Fixt.	Lmp.	Type	Lmp.	New Type	Install Refl.	Rmv. Lamps	Rmv. Blsts.	Rmv. Hldrs.	T8 Lamps	Elect. Blsts.
Entrance	2	R1	2	I8							0	0	0	0	0
Alcove	1	R1	1	I8							0	0	0	0	0
Locker Room 1	10	R	10	I8	3	1	R2	1	W8		3	3	0	3	3
Showers 1					10	1	J1	1	J8		10	10	0	10	10
Locker Room 2	7	R	7	I8	1	1	R2	1	W8		1	1	0	1	1
Showers 2					6	1	J1	1	J8		6	6	0	6	6
Locker Room 3	3	R	3	I8							0	0	0	0	0
Restroom 1	1	R	1	I8	1	1	J1	1	J8		1	1	0	1	1
Open Area/RR 2					1	1	R2	1	W8		1	1	0	1	1
Open Area/RR 2					4	1	R	1	R8		4	4	0	4	4
Alcove 7	1	R	1	I8							0	0	0	0	0
Hallway 1					2	1	R	1	R8		2	2	0	2	2
Office 1/Kitchen	6	R	6	W2	1	1	T6	1	W8		1	1	0	1	1
Break Room	12	R	8	W2							0	0	0	0	0
Offices 3&4	6	R1	6	W2							0	0	0	0	0
Mens Toilet	2	R	2	I8	1	1	T6	1	W8		1	1	0	1	1
Hall/Jan/RR Ent					3	1	R	1	R8		3	3	0	3	3
Womens Toilet	2	R1	2	I8							0	0	0	0	0
Entrance 2					1	1	R1	1	R8		1	1	0	1	1
Mens Change	10	R	10	I8	3	1	T6	1	W8		3	3	0	3	3
Mens Shower					9	1	J1	1	J8		9	9	0	9	9
Open Area 2	2	R	2	I8							0	0	0	0	0
Restroom 5	2	R	2	I8	1	1	R1	1	W8		1	1	0	1	1
Womens Lockers	6	R	6	I8	1	1	R2	1	W8		1	1	0	1	1
Womens Shower					6	1	J1	1	J8		6	6	0	6	6
Womens Toilet	3	R	3	I8	1	1	R2	1	W8		1	1	0	1	1
Toilet Alcove	1	R	1	I8							0	0	0	0	0
Ice Machine	2	R	2	I8							0	0	0	0	0
Clothing Issue	6	R1	6	I8							0	0	0	0	0
Mask Storage	12	R	12	I8							0	0	0	0	0
Totals	97		93		55					0	55	55	0	55	55

80	R			4' 1L Corridor Wrap
17	R1			4' 1L Corridor Wrap
		73	I8	4' 1L Surface Strip
		20	W2	4' 2L Ceiling Wraparound

8.0 REVIEW COMMENTS AND RESPONSES

PROJECT: EEAP, LIGHTING STUDY, PINE BLUFF ARSENAL, DACA01-94-D-0038, DELIVERY ORDER NO. 0001

REVIEWER: EMMERLING

DATE: 19 APR 95

CMT#	REF	COMMENT
1	GEN	Provide summary table with the following for each room, each building: Room classification per AEI (if applicable), AEI FT-C, AVG FT-C present, AVG FT-C proposed, AVG FT-C measured, light loss factor, reflectances for floor, wall, and ceiling for present and proposed.
2	GEN	Provide tab for each building in the detailed calculations volumes.
3	GEN	Label all point by point calculations as present or proposed OMN each sheet or define as notes.
4	GEN	Provide assumed hours of wattage and ballast for each building used in LCCA. Survey forms did not show hours of operation.
5	GEN	Provide assumed lamp wattage and ballast for each building used in LCCA. Survey forms did not show lamp wattage in some areas.
6	GEN	Provide narrative w/all assumptions on LTG calcs. Describe present and proposed.
7	GEN	Need to arrange point by point sheets IAW project calculation summary, Building 10-020.
8	GEN	Provide backup data for LLF, why is LLF different for present and proposed.
9	GEN	provide coefficient of utilization for present and proposed on point by point, each room, each building.

10	GEN	Provide brief description of retrofit for each room, each building. This is needed to verify calcs and estimate.
11	GEN	Some buildings contained present LTG calcs but no proposed. Explain in narrative.
12	GEN	Did not find area dimensions on some proms in buildings survey sheets on 10-030, 13,010, 31,080, 32, 070, 32-100, 31-130, 32-150, 33-530, and 34-120.
13	GEN	Is estimate provided in FY 95 dollars? Provide cost growth and escalate to award year per Pine Bluff arsenal DPW.
14	Volume I, 2-1	Add buildings 1-9 (First nine buildings).
15	Volume I, Fig 2-5	"TOTAL" should be "AVERAGE"
16	Volume I, Table 4-3	Divide "Lamps Removed" into "Standard" and "Watt-misers"
17	Volumes IIA-IIE	Include cut sheets on fixtures
18	Volumes IIA-IIE	Include specifications on lamps, ballasts and reflectors
19	Volumes IIE Appendix D	Remove AP&L bill

MOBILE DIST. OFFICE PROJECT REVIEW COMMENTS	DATE: 8 May 95	PAGE 1 of 1
TO: Army Corps of Engineers Little Rock District	FROM: (Section): EN-DM (Reviewer): Robert S. Woodruff	
PROJECT: Lighting Survey of Existing Buildings LOCATION: Pine Bluff Arsenal, Arkansas	Year:	Line Item No.:

Type of Action: Interim Submittal

Item No.	Drawing No. Or Par. No.	COMMENTS	Review Action
1.	Vol. 1 P. 2-2 Para. 2.3.1	This paragraph addresses an increase in the energy consumption and then tells the reader why there was a decrease in the energy consumption.	
2.	Vol. 1 P. 2-11	The summer and winter Energy costs appear to be reversed. Please verify.	
3.	General	Excellent Interim Submittal. The data, methods, calculations and conclusions are well presented. The conclusions are logical.	

RESPONSES TO EMMERLING COMMENTS

CMT#

1. See Volume I, Section 6.0.

2. Provided.

3. Provided as explanation in Volume IIA.

4. See Volume I Section 4.0, page 4-5.

5. Lamp wattages and ballasts are contained in detailed calculations, Volumes IIA through IIE.

6. See Volume I, Section 6.0.

7. Notes; instructions provided to recipients.

8. See Section 6.0.

9. Included with fixture data; see Volumes IIA-IIE.

10. See Volume I, Section 7.0 for summary tables. Data are also included in detailed calculations, Volumes IIA-IIE.

11. Rooms for which there are no proposed lighting calculations are those with infrequent operating hours such as janitor's closets, etc.

12. Area dimensions were taken from drawings.

13. Cost escalations are provided in project documentations Volume IV.

14. Added.

15. Corrected.

16. Provided.

17. Included.

18. Included.

19. Removed.

RESPONSES TO WOODRUFF

ITEM #

1. Corrected.

2. Typographical error on winter energy cost - should be $0.0258/kWh.

3. Noted - thank you.