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DINING FACILITIES ENERGY AUDIT

FORT ORD
PRESIDIO OF MONTEREY
CALIFORNIA

EXECUTIVE SUMMARY

1987

DACA-05-87-R-0091

LEC 87088

DEPARTMENT OF THE ARMY
CONSTRUCTION ENGINEERING RESEARCH LABORATORIES, CORPS OF ENGINEERS
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FORT ORD, PRESIDIO OF MONTEREY, CA
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December 9, 1988

To the Reader:

This Report is presented as a part of a Contract with the Corps of Engineers, Sacramento Division. It is to be used as a part of an iterative process, the goal of which is reducing energy consumption at the two locations involved.

Please review, critique, and respond as instructed. Your input is appreciated.

Since, this is the Pre-Final Report, please retain all documents until the Final Submittal is forwarded to you. Instructions will be included concerning which pages to replace and which to keep.

Thank you for your cooperation.

LIST ENGINEERING COMPANY

EXECUTIVE SUMMARY

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INTRODUCTION

1.0 THIS DOCUMENT IS THE EXECUTIVE SUMMARY FOR THE ENERGY AUDIT/ENERGY ENGINEERING ANALYSIS PROGRAM FOR TEN DINING FACILITIES AT FORT ORD AND FIVE DINING FACILITIES AT THE PRESIDIO OF MONTEREY. THIS DOCUMENT IS PREPARED UNDER CONTRACT NO. DACA05-87-R-0091 BETWEEN THE CORPS OF ENGINEERS, SACRAMENTO DISTRICT AND LIST ENGINEERING COMPANY. THIS PROJECT HAS BEEN EXECUTED AS A PART OF THE DEPARTMENT OF THE ARMY'S ENERGY ENGINEERING ANALYSIS PROGRAM (EEAP).

1.1 THE OVERALL OBJECTIVE OF THE REPORT IS TO DEVELOP PROJECTS THAT WILL RESULT IN REDUCTION OF ENERGY CONSUMPTION IN COMPLIANCE WITH THE OBJECTIVES SET FORTH IN THE ARMY FACILITIES ENERGY PLAN (AFEP), WITHOUT DECREASING THE READINESS POSTURE OF THE ARMY.

1.2 THE CRITERIA UTILIZED IN PERFORMING THIS EEAP STUDY IS THE SCOPE OF WORK (SOW) DATED OCTOBER 1986, REVISED 1 FEBRUARY 1988, WHICH INCLUDES THE DETAILED SOW FOR THE (15) FIFTEEN DINING FACILITIES AT FORT ORD AND THE PRESIDIO OF MONTEREY. THE COMPLETE SOW IS PROVIDED IN APPENDIX A OF THE FINAL REPORT. THE TWO WWII WOOD DINING FACILITIES, BUILDINGS 1973 AND 2568, WERE NO LONGER IN USE FOR DINING; THEREFORE AT THE DIRECTION OF FORT ORD DIRECTORATE OF ENGINEERING AND HOUSING (DEH) AND THE PROJECT MANAGER, BUILDINGS 2563 AND 2123 WERE AUDITED INSTEAD. BUILDINGS 2563 AND 2123 ARE OF THE SAME TYPE AS BUILDINGS 1973 AND 2568. ALL ENERGY CONSERVATION OPPORTUNITIES (ECO'S) ARE INCLUDED WITH EACH PAYBACK PERIOD AND SAVINGS TO INVESTMENT RATIO (SIR) IN TABLES.

1.3 THE MILD CLIMATE AT FORT ORD AND THE PRESIDIO OF MONTEREY (POM) DOESN'T JUSTIFY AIR CONDITIONING (A/C) SEE TABLE 1. ARMY REGULATIONS DO NOT ALLOW AIR CONDITIONING IN THIS AREA (UNLESS IT IS A COMPUTER FACILITY OR SPECIALIZED FUNCTION).

1.4 IT HAS BEEN ASSUMED THAT ALL IMPROVEMENT PROJECTS WILL BE AWARDED AND CONSTRUCTED IN FY1989. THE UNIFORM PRESENT WORTH (UPW) DISCOUNT FACTORS UTILIZED IN THE SIR LIFE CYCLE COST ECONOMIC ANALYSIS ARE TAKEN DIRECTLY FROM TABLE 9 OF THE "ENERGY CONSERVATION INVESTMENT PROGRAM" (ECIP) JUNE 1986. TABLE 9 UPW DISCOUNT FACTORS ARE BASED UPON A 7% DISCOUNT RATE AND DEPARTMENT OF ENERGY (DOE) PROJECTED FUEL ESCALATION RATES FOR REGION 9 WHICH INCLUDES FORT ORD, CALIFORNIA. THE MAXIMUM POSSIBLE ECONOMIC LIFE FOR ALL ECO PROJECTS IS 25 YEARS. THE UPW DISCOUNT FACTOR FOR ANNUAL RECURRING NON ENERGY SAVINGS OR COSTS WAS TAKEN FROM "ECIP GUIDANCE", 6 AUGUST 1982, TABLE "A".

1.5 HIGHLIGHTS OF THE STUDY RESULTS.

1.5.1 FIVE ENERGY CONSERVATION OPPORTUNITY (ECO'S) PROJECTS ARE PRESENTED, WHICH REPRESENT GROUPINGS OF SMALLER ECO'S HAVING SAVINGS INVESTMENT RATIOS (SIR'S) GREATER THAN ONE AND SIMPLE PAYBACK (PB) OF LESS THAN TEN YEARS. THE FIVE COMBINED PROJECTS REPRESENT A $34,241 ANNUAL ENERGY SAVINGS WHICH IS 14% OF THE $244,317 ENERGY ANNUAL COSTS. TOTAL CONSTRUCTION COST FOR THE FIVE PROJECTS IS $174,529 IF THE PROJECTS ARE COMPLETED IN FISCAL YEAR (FY)89.

FORT ORD WEATHER STATISTICS
TABLE 1

MONTH	TEMPERATURE (°F)[a] AVG.MAX	AVG.MIN	MEAN	HEATING DEGREE DAYS[b]	INSOLATION ON HORIZONTAL SURFACE (BTU/FT^2-DAY)[c]
JAN	59.9	42.8	51.3	575	613
FEB	61.7	44.4	53.0	447	824
MAR	61.7	44.3	53.0	450	1,124
APR	62.9	45.1	54.0	352	1,823
MAY	64.4	47.5	55.9	280	1,871
JUNE	66.8	49.8	58.3	190	1,968
JULY	67.8	51.2	59.5	154	1,743
AUG	69.0	52.3	60.7	153	1,519
SEP	72.2	52.6	62.4	125	1,347
OCT	70.5	50.7	60.6	203	1,056
NOV	65.7	46.9	56.3	356	659
DEC	61.1	43.5	52.3	533	541
AVG	65.3	47.6	56.4	TOTAL 3,818	15,088

a SOURCE: NATIONAL WEATHER SERVICE DATA, VOLUNTEER-OBSERVER CLIMATOLOGICAL STATION, MONTEREY, CA (REF.1).

b FACILITY DESIGN AND PLANNING: ENGINEERING WEATHER DATA,"DEPARTMENTS OF THE AIR FORCE, THE ARMY, AND THE NAVY, JULY 1, 1978 (REF.2).

c BENNETT, IVEN, "MONTHLY MAPS OF MEAN DAILY INSOLATION FOR THE UNITED STATES," SOLAR ENERGY, 1965, VOL. 9, NO.3 (REF.3).

1.6 THE PRINCIPLE TYPE OF ENERGY CONSERVATION METHODS THAT MET THE SIR AND PB CRITERIA WERE:

1.6.1 ADDING CEILING INSULATION TO BRING THE THERMAL RESISTANCE (R) RATING TO AT LEAST R-30 FOR THE COMBINED CEILING ELEMENTS. IN MOST CASES THIS MEANS EITHER BLOWING IN INSULATION ABOVE THE CEILING OR LAYING A 6" BATT OF INSULATION ABOVE THE CEILING.

1.6.2 INSTALLING 2" RIGID INSULATION UNDER THE FLOORS OF BUILDINGS WITH CRAWL SPACES.

1.6.3 INSULATING DOMESTIC HOT WATER AND STEAM PIPES.

1.6.4 REPLACING INCANDESCENT LAMPS WITH FLUORESCENT LAMPS.

1.6.5 INSTALLING OR REPAIRING WEATHER SEALS AROUND OUTSIDE WINDOWS AND DOORS.

1.6.6 USING PHOTOCELLS TO CONTROL INTERIOR LIGHTS NEAR WINDOWS IN DINING AREAS.

1.6.7 THE OTHER TYPES OF ECO'S INVESTIGATED ARE DISCUSSED IN SECTION 5.

2.0 BUILDING DATA:

2.1 NONE OF THE DINING FACILITIES HAVE AIR CONDITIONING (A/C). ALL THE BUILDINGS ARE HEATED BY BOILERS EXCEPT BUILDING #221 WHICH HAS A GAS FURNACE, BUILDING 2563 HAS NO SPACE HEAT AND BUILDING 2123 HAS TWO SMALL SPACE HEATERS.

2.2 SEE TABLE 2 FOR BUILDING SPECIFICS.

3.0 PRESENT ENERGY CONSUMPTION.

3.1 THE 15 DINING FACILITIES CURRENTLY CONSUME 23,196.5 MBTU/YR OF NATURAL GAS FOR PROCESS AND HEATING, 7,024.2 MBTU/YR OF ELECTRICITY FOR LIGHTING AND MOTORS, FOR A TOTAL OF 30,220.7 MBTU/YR, (SEE FIG 1).

3.2 THE 15 DINING FACILITIES CURRENTLY SPEND $117,608/YR ON NATURAL GAS FOR PROCESS AND HEATING, $126,709/YR ON ELECTRICITY FOR LIGHTING AND MOTORS, FOR A TOTAL OF $244,317/YR, (SEE FIG. 2).

3.3 PROPANE IS NOT USED AT THE DINING FACILITIES AND FUEL OIL IS A STANDBY FUEL AT SOME OF THE BOILERS.

TABLE 2

BUILDING DESCRIPTION

BLDG #	LOCATION	YEAR BUILT	AREA	TYPE OF CONST.	REMARKS
3585	FORT ORD	1983	14,564 FT^2	CONC/CMU	CONCRETE
3641	FORT ORD	1978	13,878 FT^2	CONC/CMU	CONCRETE MASONRY UNITS
4453	FORT ORD	1970	11,399 FT^2	CONC/CMU	
4455	FORT ORD	1970	11,399 FT^2	CONC/CMU	
4468	FORT ORD	1970	11,399 FT^2	CONC/CMU	
4953	FORT ORD	1953	5,000 FT^2	CONC/CMU	STOCKADE
4260	FORT ORD	1965	4,400 FT^2	CONC/CMU	NCO CLUB, SEE NOTE 1
4368	FORT ORD	1971	6,200 FT^2	BRICK/CONC	OFFC'S CLUB SEE NOTE 1
627	POM	1957	3,200 FT^2	CONC/CMU	SAME BASIC FLOOR PLAN ACCEPT 627
629	POM	1965	3,200 FT^2	CONC/CMU	WAS REMODELED EACH HAS ATTACHED
630	POM	1969	2,970 FT^2	CONC/CMU	BARRACKS AREA.
326	POM	1904	9,520 FT^2	WOOD	SEE NOTE 2
221	POM	1904	2,320 FT^2	BRICK/WOOD FRAME	SEE NOTE 2

WWII WOOD DINING FACILITY

2123	FORT ORD	1940	2,206 FT^2	WOOD	SAME FLOOR PLAN
2563	FORT ORD	1940	2,206 FT^2	WOOD	AS 23 OTHERS

NOTES:

1. AREA SHOWN IS THE SPACE IN THE CLUB THAT IS REQUIRED FOR FOOD SERVICE ONLY.
2. BUILDING IS LOCATED AND IS PART OF A LISTED HISTORICAL DISTRICT.

Fig. 1

ANNUAL ENERGY CONSUMPTION
PIE CHART

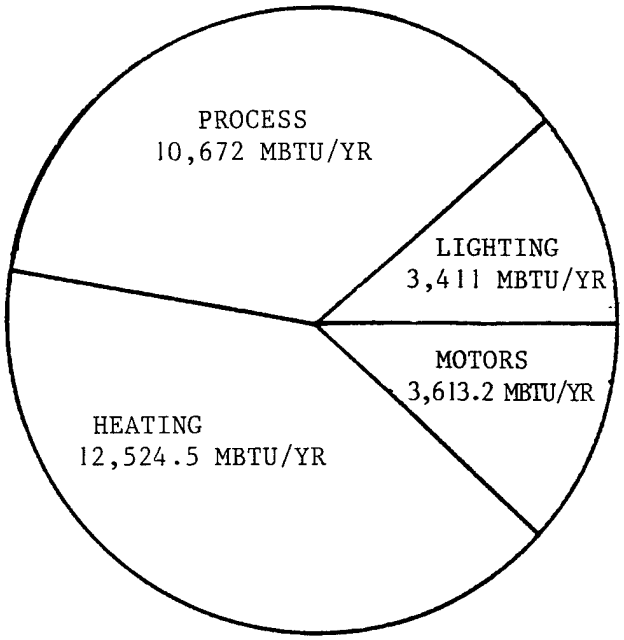
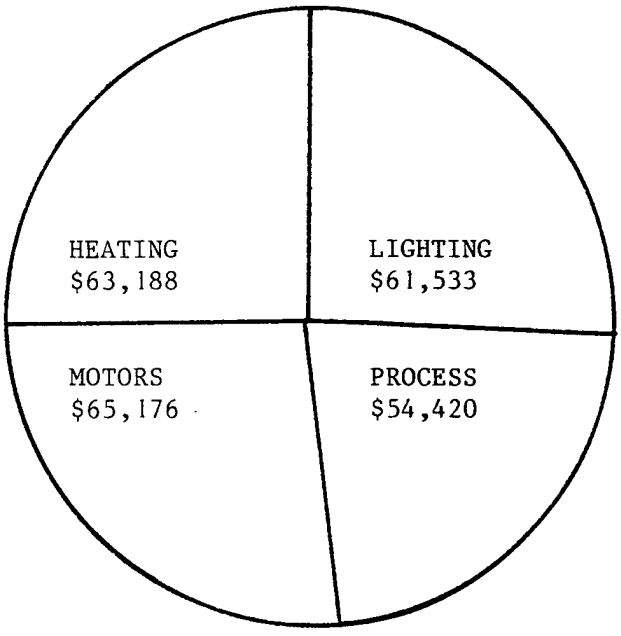


Fig. 2

ANNUAL ENERGY COST ($)
PIE CHART



4.0 HISTORICAL ENERGY CONSUMPTION.

4.1 INVESTIGATION OF THE BASEWIDE ENERGY AUDIT (JULY 1982), INFORMATION FROM THE LOCAL UTILITY (PACIFIC GAS & ELECTRIC), AND THE ANALYSIS OF THE DATA COLLECTED FOR THIS SURVEY WERE USED TO DETERMINE THE BASELINE ENERGY USAGE DATA (FIG. 1)

5.0 ENERGY CONSERVATION ANALYSIS:

5.1 ECO'S INVESTIGATED ARE LISTED BELOW:

INSULATION (WALL, ROOF, PIPE, DUCT, ETC.)

INSULATED GLASS OR DOUBLE GLAZED WINDOWS

WEATHER STRIPPING AND CAULKING - AT WINDOWS AND DOORS

INSULATED PANELS - AT WINDOWS

SOLAR FILMS - AT WINDOWS

VESTIBULES - AT BUILDING ENTRANCES

REDUCTION OF GLASS AREA

SHUTDOWN ENERGY TO HOT WATER HEATERS OR MODIFY CONTROLS

ENERGY CONSERVING FLUORESCENT LAMPS AND BALLASTS

REDUCE LIGHTING LEVELS

REPLACE INCANDESCENT LIGHTING

USE MORE EFFICIENT LIGHTING

NIGHT SETBACK THERMOSTATS

INFRARED HEATERS

ECONOMIZER CYCLES (DRY BULB)

HEAT RECLAIM FROM KITCHEN EXHAUST

HEAT RECOVERY FROM DISHWASHER HOT WATER

BOOSTER HEATERS AT MAJOR HOT WATER USERS

LOWER DOMESTIC HOT WATER TEMPERATURE

UPGRADE HVAC CONTROLS

MAKE HVAC OPERATIONS MORE EFFICIENT

OPTIMIZE DINING FACILITIES OPERATION AND EQUIPMENT

BALANCE HVAC SYSTEM

CHANGE TO VARIABLE AIR VOLUME (VAV) SYSTEM

USE AIR CURTAINS/PLASTIC STRIPS AT PERSONNEL ENTRANCES

INSTALL MAKEUP AIR SUPPLY FOR KITCHEN AREA

SHUT OFF RANGE HOOD EXHAUST WHENEVER POSSIBLE

USE OF HEAT PUMP TO HEAT DOMESTIC HOT WATER AND COOL DINING AREA

WASTE HEAT RECOVERY

THERMAL STORAGE

STEAM TRAP INSPECTION

INSTANTANEOUS HOT WATER HEATERS

DESTRATIFICATION

CONVERT TO ENERGY EFFICIENT/SMALLER MOTORS

REFLECTORS FOR FLUORESCENT FIXTURES

WATER SPRAY ROOF COOLING

OCCUPANCY SENSORS

5.2 ECO'S RECOMMENDED:

5.2.1 ADD CEILING INSULATION TO BRING THE THERMAL RESISTANCE (R) RATING TO AT LEAST R-30 FOR THE COMBINED CEILING ELEMENTS.

5.2.2 INSTALL 2" OF RIGID INSULATION UNDER THE FLOORS OF BUILDINGS WITH CRAWL SPACES.

5.2.3 INSULATE VARIOUS LENGTHS OF UNINSULATED DOMESTIC HOT WATER AND/OR STEAM LINES.

5.2.4 REPLACE INCANDESCENT LAMPS WITH FLUORESCENT LAMPS.

5.2.5 INSTALL AND/OR REPAIR WEATHER SEALS AROUND OUTSIDE WINDOWS AND DOORS.

5.2.6 USING PHOTOCELLS TO CONTROL INTERIOR LIGHTS NEAR WINDOWS IN THE DINING AREAS WHEN BRIGHT SUNLIGHT IS AVAILABLE.

5.3 ECO'S REJECTED:

5.3.1 WALL INSULATION WAS REJECTED BECAUSE OF THE COST RESTORING THE APPEARANCE OF INTERIOR OR EXTERIOR MASONRY WALLS AFTER APPLICATION OF INSULATION.

5.3.2 THE COST OF REPLACING EXISTING WINDOWS WITH INSULATED OR DOUBLE PANE GLASS REDUCED THE SIR TO BELOW 1 AND/OR THE PB ABOVE 10 YEARS.

5.3.3 INSULATED PANELS, REDUCTION OF GLASS AREA, AND SOLAR FILMS OVER WINDOWS RESTRICT NATURAL LIGHTING AND REDUCE LIGHTING LEVEL AT INTERIOR PERIMETERS. IN ADDITION, WITH THE MILD CLIMATE AND NO A/C THE PAYBACK WOULD BE OVER 10 YEARS.

5.3.4 VESTIBULES WERE REJECTED WHERE NOT ALREADY IN PLACE BECAUSE BUILDING ARCHITECTURE DOESN'T LEND ITSELF TO THIS TYPE OF CONSTRUCTION MODIFICATION.

5.3.5 TIME CLOCK CONTROLS ON DOMESTIC HOT WATER HEATERS WAS REJECTED BECAUSE MOST OF THE DINING FACILITIES ARE USED OVER 20 HOURS PER DAY AND REHEAT COST AND TIMING WOULD NOT GENERATE SIGNIFICANT SAVINGS.

5.3.6 NIGHT SETBACK THERMOSTATS WERE NOT RECOMMENDED BECAUSE OF THE MILD CLIMATE, 20 HOUR OR MORE USAGE/DAY, AND THAT A LARGE PORTION OF THE HEAT IS FROM PROCESS HEAT.

5.3.7 INFRARED HEATERS ARE NOT PRACTICAL IN LOW CEILING AREAS.

5.3.8 VARIABLE AIR VOLUME SYSTEM IS NOT USED UNLESS A/C SYSTEM EXISTS.

5.3.9 HEAT RECLAIM FROM KITCHEN EXHAUST WAS REJECTED DUE TO LOW ▲T BETWEEN WITH THE MILD CLIMATE AND THE EXHAUST AIR.

5.3.10 HEAT RECOVERY FROM DISHWASHER HOT WATER WOULD BE HARD TO LAYOUT IN EXISTING BUILDINGS AND FOULING PROBLEMS WOULD OCCUR FROM A KITCHEN WASTE STREAM. (SOLIDS & GREASE).

5.3.11 BOOSTER HEATERS AT MAJOR HOT WATER USERS EXIST WHERE NEEDED.

5.3.12 DOMESTIC HOT WATER TEMPERATURES WERE GENERALLY APPROPRIATE, REFER TO THE TEXT OF THE FINAL REPORT.

5.3.13 HVAC BALANCE AND CONTROLS: ROOF TOP AIR HANDLERS NEED REPAIR IN MANY CASES, WHICH WOULD IMPROVE OPERATION BUT NOT GENERATE A SAVINGS. MANY AIR HANDLERS ARE IN AN EXTENDED STATE OF DISREPAIR.

5.3.14 OPTIMIZE DINING FACILITIES OPERATION AND EQUIPMENT. THIS ISSUE IS ADDRESSED IN THE REPORT AND IS NEEDED BUT PUTTING A SAVINGS DOLLAR AMOUNT ON IT WOULD BE STRICTLY A FABRICATION.

5.3.15 USE OF AIR CURTAINS/PLASTIC STRIPS AT PERSONNEL ENTRANCES ARE NOT RECOMMEND BECAUSE OF THE LOW ▲T IN THIS CLIMATE.

5.3.16 INSTALLING MAKEUP AIR SUPPLY FOR KITCHEN AREA: EXISTS BUT IN MANY CASES IT IS OUT OF SERVICE.

5.3.17 SHUT OFF RANGE HOOD EXHAUST WHENEVER POSSIBLE: THIS IS A GOOD OPERATIONAL PROCEDURE AND IS ADDRESSED UNDER RECOMMENDED OPERATIONS.

5.3.18 USE OF HEAT PUMP TO HEAT DOMESTIC HOT WATER AND COOL DINING AREA IS NOT RECOMMENDED BECAUSE NO A/C OR HEAT PUMPS EXIST.

5.3.19 WASTE HEAT RECOVERY WAS REJECTED DUE TO LOW ▲T'S IN THIS MILD CLIMATE.

5.3.20 THERMAL STORAGE WAS REJECTED BECAUSE OF THE COST TO CONSTRUCT A SYSTEM AND THE LOW RETURN IN THIS MILD CLIMATE.

5.3.21 STEAM TRAPS WERE INSPECTED AND FOUND IN GOOD CONDITION.

5.3.22 INSTANTANEOUS HOT WATER HEATERS ARE NOT RECOMMENDED BECAUSE THEY ARE PRACTICAL IN AREAS OF LOW AND INFREQUENT USAGE WHICH IS NOT THE CASE IN A COMMERCIAL KITCHEN.

5.3.23 DESTRATIFICATION: NOT PRACTICAL BECAUSE OF LOW CEILINGS.

5.3.24 CONVERT TO ENERGY EFFICIENT SMALLER MOTORS: NOT RECOMMENDED AS AN ECO BECAUSE OF THE HIGH COST LONG PB BUT SHOULD BE USED TO REPLACE EXISTING MOTORS WHEN NEEDED.

5.3.25 REFLECTORS FOR FLUORESCENT FIXTURES WOULD NOT REDUCE LAMPS BUT IT IS RECOMMENDED THAT FIXTURES BE CLEANED REGULARLY.

5.3.26 WATER SPRAY ROOF: COOLING IS NOT NEEDED IN THIS CLIMATE.

5.3.27 OCCUPANCY SENSORS: FREQUENT ON/OFF CYCLING SHORTENS THE LIFE OF EQUIPMENT, ESPECIALLY LAMPS.

5.4 NO ECIP PROJECTS COULD BE DEVELOPED.

5.5 FIVE NON-ECIP PROJECTS WERE DEVELOPED.

5.5.1 PROJECT #1 INVOLVES BUILDING 221 AND 326 AT THE POM. BUILDING 221 WOULD HAVE CEILING INSULATION INSTALLED, WEATHER SEALS REPLACED AROUND WINDOW OPENINGS AND INCANDESCENT LAMPS CONVERTED TO FLORESCENT. BUILDING 326 WOULD HAVE FLOOR INSULATION INSTALLED, DHW LINES INSULATED, INCANDESCENT LAMPS CONTROLLED BY A NEW DIMMER SWITCH AND WEATHER SEALS REPLACED AROUND WINDOW OPENINGS. (TABLE 4).

5.5.2 PROJECT #2 INVOLVES BUILDINGS 2563 AND 2123 AT FORT ORD. BOTH BUILDINGS WOULD GET CEILING, FLOOR AND DHW INSULATION, PHOTOCELLS FOR CONTROL OF PERIMETER INTERIOR LIGHTS, AND WEATHER SEALS AT WINDOW OPENINGS. (TABLE 5).

5.5.3 PROJECT #3 INVOLVES BUILDINGS 4368 AND 4260 AT FORT ORD. BOTH BUILDINGS WOULD GET INCANDESCENT LAMPS CHANGED TO FLUORESCENT AND CEILING AND DHW LINE INSULATION. BUILDING

4.3.18 USE OF HEAT PUMPS IS NOT FEASABLE BECAUSE AIR CONDITIONING THESE DINING FACILITIES IS NOT AUTHORIZED.

4.3.19 WASTE HEAT RECOVERY WAS REJECTED DUE TO LOW T'S IN THIS MILD CLIMATE AND INCREASED MAINTENANCE REQUIREMENTS.

4.3.20 THERMAL STORAGE WAS REJECTED BECAUSE AIR CONDITIONING IS NOT UN USE.

4.3.21 STEAM TRAPS WERE INSPECTED AND FOUND IN GOOD CONDITION.

4.3.22 INSTANTANEOUS HOT WATER HEATERS ARE NOT RECOMMENDED BECAUSE SPACE, UTILITY AND COST CONSTRAINTS.

4.3.23 DESTRATIFICATION: NOT PRACTICAL BECAUSE OF LOW CEILINGS.

4.3.24 CONVERT TO ENERGY EFFICIENT SMALLER MOTORS: NOT RECOMMENDED AS AN ECO BECAUSE OF THE HIGH COST AND LONG PB BUT SHOULD BE USED TO REPLACE EXISTING MOTORS WHEN NEEDED.

4.3.25 CHANGING REFLECTORS ON FLUORESCENT FIXTURES AND REDUCING TUBES WOULD REDUCE LIGHT LEVELS. IT IS NOT RECOMMENDED THAT THIS ECO BE IMPLEMENTED.

4.3.26 WATER SPRAY ROOF: COOLING IS NOT NEEDED IN THIS CLIMATE.

4.3.27 LIGHTING CONTROLS: OCCUPANCY SENSORS ARE NOT RECOMMENDED, SOME DAYLIGHT CONTROLS ARE RECOMMENDED.

4.3.28 BOILER ECONOMIZERS: VERY POOR PAYBACK ON STEAM BOILERS.

4.4 NO ECIP PROJECTS COULD BE DEVELOPED.

4.5 FIVE NON-ECIP PROJECTS WERE DEVELOPED.

4.5.1 PROJECT #1 INVOLVES BUILDING 221 AND 326 AT THE POM. BUILDING 221 WOULD HAVE CEILING INSULATION INSTALLED, INCANDESCENT LAMPS CONVERTED TO FLUORESCENT, AND WEATHER SEALS REPLACED AROUND WINDOW OPENINGS. BUILDING 326 WOULD HAVE FLOOR INSULATION INSTALLED AND WEATHER SEALS REPLACED AROUND WINDOW OPENINGS. (TABLE 3).

4.5.2 PROJECT #2 INVOLVES BUILDINGS 2568 AND 2123 AT FORT ORD. BUILDING 2123 WOULD GET CEILING, FLOOR INSULATION, PHOTOCELLS FOR CONTROL OF PERIMETER INTERIOR LIGHTS, AND WEATHER SEALS AT WINDOW OPENINGS. BUILDING 2568 WOULD GET PHOTOCELL CONTROL OF LIGHTS. (TABLE 4).

4.5.3 PROJECT #3 INVOLVES BUILDINGS 4368 AND 4260 AT FORT ORD. BOTH BUILDINGS WOULD GET INCANDESCENT LAMPS CHANGED TO FLUORESCENT AND CEILING INSULATION. BUILDING 4260 WOULD ALSO

GET FLOOR INSULATION, DHW STORAGE TANK INSULATED, AND WEATHER SEALS AT THE EXTERIOR WINDOWS. (TABLE 5).

4.5.4 PROJECT #4 INVOLVES BUILDINGS 627, 629 AND 630 AT THE POM. ALL THREE BUILDINGS WOULD GET FLOOR AND CEILING INSULATION AND WINDOW WEATHER SEALS. BUILDING 629 AND 630 WOULD GET INCANDESCENT LAMPS CONVERTED TO FLUORESCENT. (TABLE 6).

4.5.5 PROJECT #5 INVOLVES BUILDINGS 3585, 3641, 4453, 4455, 4468 AND 4953 AT FORT ORD. ALL BUILDINGS WOULD HAVE THE FLOORS INSULATED. BUILDING 4953 WOULD HAVE THE WINDOWS WEATHER SEALED. BUILDING 4453, 4455 AND 4468 WOULD GET PHOTOCELLS TO CONTROL INTERIOR PERIMETER LIGHTING. BUILDINGS 3585 AND 3641 WOULD HAVE CERTAIN INCANDESCENT LAMPS CONVERTED TO FLORESCENT. (TABLE 7).

4.6 OPERATION POLICY RECOMMENDATIONS: DURING THE SURVEY IT WAS APPARENT THAT THE DINING FACILITY STAFFS WERE CONSCIOUS OF ENERGY CONSERVATION. EFFORTS WERE BEING MADE TO MINIMIZE ENERGY WASTE. UNNECESSARY LIGHTS WERE BEING TURNED OFF AND WATER WAS NOT GENERALLY LEFT RUNNING. CLEANLINESS WAS IMPRESSIVE AT ALL LOCATIONS. FOUR AREAS OF OPERATIONAL ITEMS NEED TO BE ADDRESSED.

4.6.1 THE FREEZERS AND REFRIGERATORS SHOULD BE POSTED WITH THE NORMAL OPERATING TEMPERATURE RANGE NEAR THE THERMOMETER. A DAILY AUDIT WOULD COMPARE ACTUAL TEMPERATURE TO POSTED TEMPERATURE. THE PROPER TEMPERATURE COULD THEN BE RESET OR MAINTENANCE COULD BE CALLED FOR REPAIRS. LOW TEMPERATURE WASTES ENERGY AND TOO HIGH OF A TEMPERATURE, WHICH CANNOT BE LOWERED, INDICATES A MALFUNCTIONING COMPRESSOR.

4.6.2 LIGHT SWITCHES SHOULD BE POSTED WITH STICKERS THAT LIST HOURS WHEN LIGHTS SHOULD BE TURNED OFF.

4.6.3 ROOF MOUNTED HEATING AND VENTILATING EQUIPMENT NEEDS A WEEKLY INSPECTION. THE EQUIPMENT NEEDS INCLUDE: REPAIR MOTORS, REPLACE BELTS AND CORRECT OUT OF BALANCE FANS. IT WAS NOT UNCOMMON TO FIND 50% OR MORE OF THE FANS OUT OF SERVICE OR MOTORS RUNNING WITH LOOSE OR NO BELTS. THE QUALITY OF AIR IN THE KITCHENS SUFFERS. WHEN MOTORS ARE REPLACED, IT SHOULD BE WITH THE HIGH EFFICIENCY TYPE.

4.6.4 THE DINING FACILITY MANAGER COULD BETTER MONITOR ENERGY CONSUMPTION IF WATER, NATURAL GAS AND ELECTRIC METERS WERE INSTALLED AT EACH LOCATION. WITHOUT HISTORICAL DATA TO COMPARE, THE MANAGER CANNOT SET AND MAINTAIN AN ENERGY BUDGET. MAINTENANCE COULD BE ALERTED TO DEVIATIONS FROM NORMAL ENERGY CONSUMPTION AND AND TAKE CORRECTIVE ACTION. ENERGY SAVINGS WOULD BE DIFFICULT TO PREDICT, THEREFORE NO ECO WAS GENERATED FOR INSTALLING METERS.

TABLE 4

PROJECT #1

BUILDING 221 POM ENERGY CONSERVATION OPPORTUNITIES

DESCRIPTION	SAVINGS $/YR	$ COSTS & SIOH	SAVINGS INV.RATIO	PAYBACK YEARS	MBTU & TYPE
INC. TO FLUOR.	85	254	6.1	2.8	4.5 EL*
INS. CLG.	109	712	2.8	6.2	20.7 NG**
WINDOW SEALS	67	445	2.8	6.3	12.7 NG

BUILDING 326 POM ENERGY CONSERVATION OPPORTUNITIES

DESCRIPTION	SAVINGS $/YR	$ COSTS & SIOH	SAVINGS INV.RATIO	PAYBACK YEARS	MBTU/YR & TYPE
WINDOW SEALS	124	127	18	1.0	23.6 NG
DIMMER SWITCH	340	262	17.7	.7	17.94 EL
INS. DHW	67	267	4.6	3.8	12.7 NG
INS. FLOOR	851	4,842	3.25	5.4	162.1 NG
TOTAL	$1,643	$6,909			

*EL = ELECTRIC ENERGY
**NG = NATURAL GAS ENERGY

TABLE 5

PROJECT #2

BUILDING 2563 FORT ORD ENERGY CONSERVATION OPPORTUNITIES

DESCRIPTION	SAVINGS $/YR	$ COSTS & SIOH	SAVINGS INV.RATIO	PAYBACK YEARS	MBTU/YR & TYPE
INS. DHW	129	400	6.0	2.9	25.8 NG**
PHOTOCELLS	139	630	3.02	4.3	7.8 EL*
WINDOW SEALS	105	687	2.8	6.2	21 NG
INS. CLG.	182	1,700	1.98	8.8	36.4 NG
INS. FLOOR	236	2,342	1.86	9.4	47.4 NG

BUILDING 2123 FORT ORD ENERGY CONSERVATION OPPORTUNITIES

DESCRIPTION	SAVINGS $/YR	$ COSTS & SIOH	SAVINGS INV.RATIO	PAYBACK YEARS	MBTU/YR & TYPE
INS. DHW	129	400	6.0	2.9	25.8 NG
PHOTOCELL	139	630	3.02	4.3	7.8 EL
WINDOW SEALS	105	687	2.8	6.2	21 NG
INS. CLG.	182	1,700	1.98	8.8	36.4 NG
INS. FLOOR	236	2,342	1.86	9.4	47.4 NG

TOTAL	$1,582	$11,518

*EL = ELECTRIC ENERGY
**NG = NATURAL GAS ENERGY

TABLE 6

PROJECT #3

BUILDING 4368 FORT ORD ENERGY CONSERVATION OPPORTUNITIES

DESCRIPTION	SAVINGS $/YR	$ COSTS & SIOH	SAVINGS INV.RATIO	PAYBACK YEARS	MBTU/YR & TYPE
INC. TO FLUOR.	939	1,908	.9	1.9	52.5 EL*
INS. DHW	109	267	7.6	2.3	21.75 NG**
INS. CLG.	672	3,918	3.17	5.5	134.6 NG

BUILDING 4260 FORT ORD ENERGY CONSERVATION OPPORTUNITIES

DESCRIPTION	SAVINGS $/YR	$ COSTS & SIOH	SAVINGS INV.RATIO	PAYBACK YEARS	MBTU/YR & TYPE
INS. DHW	109	267	7.6	2.3	19.26 NG
WINDOWS SEALS	437	1,243	6.5	2.7	77.3 NG
INC. TO FLUOR.	751	2,290	6	2.9	42 EL
INS. FLOOR	782	4,548	3.18	5.5	138.1 NG
INS. CLG	1,033	8,373	2.28	7.6	182.5 NG

TOTAL	$4,832	$22,814

*EL = ELECTRIC ENERGY
**NG = NATURAL GAS ENERGY

TABLE 3

PROJECT #1

BUILDING 221 POM ENERGY CONSERVATION OPPORTUNITIES

DESCRIPTION	SAVINGS $/YR	$ COSTS & SIOH	SAVINGS INV.RATIO	PAYBACK YEARS	MBTU & TYPE[6]
INC. TO FLUOR.[1]	88.37	254.00	6.31	2.7	4.67 EL
INS. CLG.[2]	100.92	712.00	2.88	6.7	19.2 NG
WINDOW SEALS[3]	61.82	445.00	2.56	6.8	11.8 NG

BUILDING 326 POM ENERGY CONSERVATION OPPORTUNITIES

DESCRIPTION	SAVINGS $/YR	$ COSTS & SIOH	SAVINGS INV.RATIO	PAYBACK YEARS	MBTU/YR & TYPE[6]
WINDOW SEALS[3]	342.92	127.00	49.9	.4	65.3 NG
INS. FLOOR[4]	786.21	4,842.00	3.00	5.8	149.8 NG
TOTAL	$1,380.24	$6,380.00	3.9	4.6	250.8

1. INCANDESENT LIGHT BULBS REPLACED BY FLUORESCENT LIGHT BULBS.
2. ADD 6" FIBERGLASS BATT CEILING INSULATION.
3. ADD/REPLACE WINDOW SEALS ON ALL OPERABLE SASH.
4. ADD 2" RIGID INSULATION TO FLOOR OVER CRAWL SPACE.
5. PHOTOCELL CONTROL OF INTERIOR LIGHTS.
6. NG = NATURAL GAS, EL = ELECTRIC.

TABLE 4

PROJECT #2

BUILDING 2568 FORT ORD ENERGY CONSERVATION OPPORTUNITIES

DESCRIPTION	SAVINGS $/YR	$ COSTS & SIOH	SAVINGS INV.RATIO	PAYBACK YEARS	MBTU/YR & TYPE[6]
PHOTOCELLS[5]	219.35	630.00	4.76	2.7	12.0 EL

BUILDING 2123 FORT ORD ENERGY CONSERVATION OPPORTUNITIES

DESCRIPTION	SAVINGS $/YR	$ COSTS & SIOH	SAVINGS INV.RATIO	PAYBACK YEARS	MBTU/YR & TYPE[6]
PHOTOCELLS[5]	219.35	630.00	4.76	2.7	12.0 EL
WINDOW SEALS[3]	79.32	687.00	2.13	8.2	15.9 NG
INS. CLG.[2]	153.75	1,700.00	1.52	10.5	30.8 NG
INS. FLOOR[4]	200.23	2,342.00	1.58	11.1	40.1 NG
TOTAL	$872.00	$5,989.00	2.4	6.9	110.8

1. INCANDESENT LIGHT BULBS REPLACED BY FLUORESCENT LIGHT BULBS.
2. ADD 6" FIBERGLASS BATT CEILING INSULATION.
3. ADD/REPLACE WINDOW SEALS ON ALL OPERABLE SASH.
4. ADD 2" RIGID INSULATION TO FLOOR OVER CRAWL SPACE.
5. PHOTOCELL CONTROL OF INTERIOR LIGHTS.
6. NG = NATURAL GAS, EL = ELECTRIC.

TABLE 8

PROJECT #5

BUILDING 3585 & 3641 FORT ORD ENERGY CONSERVATION OPPORTUNITIES EACH

DESCRIPTION	SAVINGS $/YR	$ COSTS & SIOH	SAVINGS INV.RATIO	PAYBACK YEARS	MBTU/YR & TYPE
INC. TO FLUOR	1,886	3,244	10.6	1.6	105.5 EL*
INS. DHW	109	267	7.6	2.3	21.75 NG**
INS. FLOOR	1,634	10,786	2.8	6.2	327.5 NG

BUILDING 4453, 4455, & 4468 FORT ORD ENERGY CONSERVATION OPPORTUNITIES EACH

DESCRIPTION	SAVINGS $/YR	$ COSTS & SIOH	SAVINGS INV.RATIO	PAYBACK YEARS	MBTU/YR & TYPE
INS. DHW	179	400	8.3	2.1	35.9 NG
INS. FLOOR	1,784	11,778	2.8	6.2	357.4 NG
PHOTOCELLS	541	3,582	2.0	6.3	30.3 EL

BUILDING 4953 FORT ORD ENERGY CONSERVATION OPPORTUNITIES

DESCRIPTION	SAVINGS $/YR	$ COSTS & SIOH	SAVINGS INV.RATIO	PAYBACK YEARS	MBTU/YR & TYPE
INS. DHW	85	213	5.9	2.4	16.9 NG
WINDOW SEALS	148	558	4.9	3.6	29.5 NG
INS. FLOOR	824	6,869	2.2	7.9	165.1 NG

TOTAL ALL SIX BUILDINGS	$15,827	$83,514

*EL = ELECTRIC ENERGY
**NG = NATURAL GAS ENERGY

TABLE 5

PROJECT #3

BUILDING 4368 FORT ORD ENERGY CONSERVATION OPPORTUNITIES

DESCRIPTION	SAVINGS $/YR	$ COSTS & SIOH	SAVINGS INV.RATIO	PAYBACK YEARS	MBTU/YR & TYPE[6]
INC. TO FLUOR.[1]	1,295.18	1,908.00	8.90	1.9	51.0 EL
INS. CLG.[2]	568.87	3,918.00	2.68	6.5	114.0 NG

BUILDING 4260 FORT ORD ENERGY CONSERVATION OPPORTUNITIES

DESCRIPTION	SAVINGS $/YR	$ COSTS & SIOH	SAVINGS INV.RATIO	PAYBACK YEARS	MBTU/YR & TYPE[6]
WINDOWS SEALS[3]	557.24	1,243.00	8.28	2.1	98.5 NG
INC. TO FLUOR.[1]	1,233.56	2,290.00	6.40	2.7	43.7 EL
INS. FLOOR[4]	781.24	4,548.00	3.17	5.5	138.0 NG
INS. DHW TANK	74.77	504.00	2.63	6.4	13.21 NG
INS. CLG[2]	1,153.42	8,373.00	2.54	6.9	203.8 NG
TOTAL	$5,664.28	$22,784.00	3.45	4.0	662.2

1. INCANDESENT LIGHT BULBS REPLACED BY FLUORESCENT LIGHT BULBS.
2. ADD 6" FIBERGLASS BATT CEILING INSULATION.
3. ADD/REPLACE WINDOW SEALS ON ALL OPERABLE SASH.
4. ADD 2" RIGID INSULATION TO FLOOR OVER CRAWL SPACE.
5. PHOTOCELL CONTROL OF INTERIOR LIGHTS.
6. NG = NATURAL GAS, EL = ELECTRIC.

TABLE 6

PROJECT #4

BUILDING 627 POM ENERGY CONSERVATION OPPORTUNITIES

DESCRIPTION	SAVINGS $/YR	$ COSTS & SIOH	SAVINGS INV.RATIO	PAYBACK YEARS	MBTU/YR & TYPE[6]
WINDOW SEALS[3]	240.56	1,221.00	3.6	4.8	45.9 NG
INS. FLOOR[4]	1,797.04	10,239.00	3.24	5.4	342.3 NG
INS. CLG.[2]	333.58	5,389.00	1.14	15.2	63.5 NG

BUILDING 629 POM ENERGY CONSERVATION OPPORTUNITIES

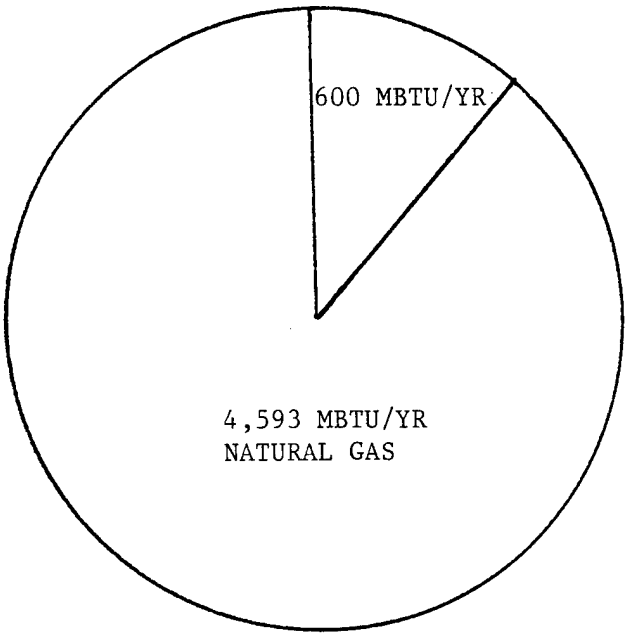
DESCRIPTION	SAVINGS $/YR	$ COSTS & SIOH	SAVINGS INV.RATIO	PAYBACK YEARS	MBTU/YR & TYPE[6]
INC. TO FLUOR.[1]	2,029.44	1,145.00	24	.6	95.8 EL
INS. FLOOR[4]	1,797.04	10,239.00	3.24	5.4	342.3 NG
WINDOW SEALS[3]	278.43	1,984.00	2.3	6.7	53.0 NG
INS. CLG.[2]	505.75	5,389.00	1.73	10.1	96.3 NG

BUILDING 630 POM ENERGY CONSERVATION OPPORTUNITIES

DESCRIPTION	SAVINGS $/YR	$ COSTS & SIOH	SAVINGS INV.RATIO	PAYBACK YEARS	MBTU/YR & TYPE[6]
INC. TO FLUOR.[1]	2,029.44	1,145.00	24	.6	95.8 EL
INS. FLOOR[4]	1,797.04	10,239.00	3.24	5.4	342.3 NG
WINDOW SEALS[3]	278.43	1,984.00	2.3	6.7	53.0 NG
INS. CLG.[2]	505.75	5,389.00	1.73	10.1	96.3 NG
TOTAL	$11,592.50	$54,363.00	3.57	4.7	1,626.5

1. INCANDESENT LIGHT BULBS REPLACED BY FLUORESCENT LIGHT BULBS.
2. ADD 6" FIBERGLASS BATT CEILING INSULATION.
3. ADD/REPLACE WINDOW SEALS ON ALL OPERABLE SASH.
4. ADD 2" RIGID INSULATION TO FLOOR OVER CRAWL SPACE.
5. PHOTOCELL CONTROL OF INTERIOR LIGHTS.
6. NG = NATURAL GAS, EL = ELECTRIC.

POTENTIAL ENERGY AND DOLLAR SAVINGS
5,193 MBTU/YR ENERGY



34,241/YR DOLLARS

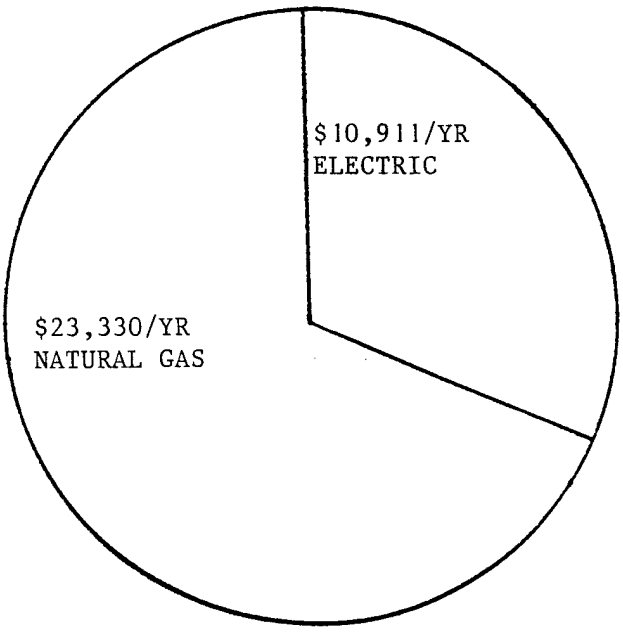


TABLE 7

PROJECT #5

BUILDING 3585 & 3641 FORT ORD ENERGY CONSERVATION OPPORTUNITIES EACH

DESCRIPTION	SAVINGS $/YR	$ COSTS & SIOH	SAVINGS INV.RATIO	PAYBACK YEARS	MBTU/YR & TYPE[6]
INC. TO FLUOR[1] (3585)	3,110.36	3,244.00	12.72	1.0	105.5 EL
INC. TO FLUOR[1] (3641)	3,353.32	3,244.00	12.72	1.0	116.1 EL
INS. FLOOR[4]	1,637.09	10,786.00	2.8	6.2	328.1 NG
INS. CLG.[2]	449.88	7,186.00	1.12	15.4	90.2 NG
PHOTOCELLS[5]	148.74	1,856.00	1.07	12.1	8.1 EL

BUILDING 4453, 4455, & 4468 FORT ORD ENERGY CONSERVATION OPPORTUNITIES EACH

DESCRIPTION	SAVINGS $/YR	$ COSTS & SIOH	SAVINGS INV.RATIO	PAYBACK YEARS	MBTU/YR & TYPE[6]
INS. FLOOR[4]	1,783.43	11,778.00	2.8	6.2	357.4 NG
PHOTOCELLS[5]	555.26	3,582.00	2.12	6.3	30.3 EL

BUILDING 4953 FORT ORD ENERGY CONSERVATION OPPORTUNITIES

DESCRIPTION	SAVINGS $/YR	$ COSTS & SIOH	SAVINGS INV.RATIO	PAYBACK YEARS	MBTU/YR & TYPE[6]
WINDOW SEALS[3]	147.82	558.00	4.9	3.6	29.6 NG
INS. FLOOR[4]	823.40	6,869.00	2.2	7.9	165.0 NG
TOTAL ALL SIX BUILDINGS	$18,922.39	$99,651.00	2.95	5.3	2,432.1

1. INCANDESENT LIGHT BULBS REPLACED BY FLUORESCENT LIGHT BULBS.
2. ADD 6" FIBERGLASS BATT CEILING INSULATION.
3. ADD/REPLACE WINDOW SEALS ON ALL OPERABLE SASH.
4. ADD 2" RIGID INSULATION TO FLOOR OVER CRAWL SPACE.
5. PHOTOCELL CONTROL OF INTERIOR LIGHTS.
6. NG = NATURAL GAS, EL = ELECTRIC.

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: PRESIDIO OF MONTEREY REGION NO. 9 PROJECT NUMBER 1

PROJECT TITLE BLDGS 221 & 326 FISCAL YEAR 1989

DISCRETE PORTION NAME DINING FACILITY ENERGY AUDIT

ANALYSIS DATE 5/89 ECONOMIC LIFE 25 YEARS PREPARED BY LEC

1. INVESTMENT
   - A. CONSTRUCTION COST $ 6020
   - B. SIOH $ 361
   - C. DESIGN COST $ 482
   - D. ENERGY CREDIT CALC (1A-1B+1C)X.9 $ 6177
   - E. SALVAGE VALUE -$
   - F. TOTAL INVESTMENT (1D-1E) $ 6177

2. ENERGY SAVINGS (+) / COST (-)
   ANALYSIS DATE ANNUAL SAVINGS, UNIT COST & DISCOUNTED SAVINGS

FUEL	* COST $/MBTU(1)	SAVINGS MBTU/YR(2)	ANNUAL $ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELEC	$ 18.93	4.7	$ 88.40	13.27	$ 1173
B. DIST	$		$		$
C. RESID	$		$		$
D. NG	$ 5.25	246.1	$ 1292.03	17.88	$ 23101
E. COAL	$		$		$
F. TOTAL		250.8	$ 1380.43		> $ 24,274.56

see p. C-24 C-26 for #1

3. NON ENERGY SAVINGS(+) / COST(-)
   - A. ANNUAL RECURRING (+/-) $
     - (1) DISCOUNT FACTOR (TABLE A) ____
     - (2) DISCOUNTED SAVING/COST (3A X 3A1) $

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

ITEM	SAVINGS(+) COST (-)(1)	YEAR OF OCCURRENCE(2)	DISCOUNT FACTOR(3)	DISCOUNTED SAVINGS(+) COST(-)(4)
a.	$			$
b.	$			$
c.	$			$
d. TOTAL	$			$

   - C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+) / COST(-) (3A2+3Bd4) $
   - D. PROJECT NON ENERGY QUALIFICATION TEST
     - (1) 25% MAX NON ENERGY CALC (2F5 X .33) $ 8010.61
       - a IF 3D1 IS = OR > 3C GO TO ITEM 4
       - b IF 3D1 IS < 3C CALC SIR = (2F5+3D1) ÷ 1F= ____
       - c IF 3D1b IS = > 1 GO TO ITEM 4
       - d IF 3D1b IS < 1 PROJECT DOES NOT QUALIFY

4. FIRST YEAR DOLLAR SAVINGS 2F5+3A+(3B1d ÷ YEARS ECONOMIC LIFE) $ 1,380.43

5. TOTAL NET DISCOUNTED SAVINGS (2F5+3C) $ 24,274

6. DISCOUNTED SAVINGS RATIO (IF < 1 PROJECT DOES NOT QUALIFY) (SIR)=(5 ÷ 1F)= 3.93

PB= 4.4 yrs

Fig. 4

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: Presidio of Monterey REGION NO. 9 PROJECT NUMBER 1

PROJECT TITLE Dining Facilities Energy Audit FISCAL YEAR 89

DISCRETE PORTION NAME Cost Savings at Buildings #221 and #326.

ANALYSIS DATE 10-31-88 ECONOMIC LIFE 25 YEARS PREPARED BY Donald J. Romines

1. INVESTMENT

A. CONSTRUCTION COST	$6,519	
B. SIOH	$391	
C. DESIGN COST	$522	
D. ENERGY CREDIT CALC (1A+1B+1C)X.9	$6,689	
E. SALVAGE VALUE	-$	
F. TOTAL INVESTMENT (1D-1E)		$6,689

2. ENERGY SAVINGS (+) / COST (-)
ANALYSIS DATE ANNUAL SAVINGS, UNIT COST & DISCOUNTED SAVINGS

FUEL	* COST $/MBTU(1)	SAVINGS MBTU/YR(2)	ANNUAL $ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELEC	$18.93	64	$1,218	13.27	$16,163
B. DIST	$		$		$
C. RESID	$		$		$
D. NG	$5.25	81	$425	17.88	$7,599
E. COAL	$		$		$
F. TOTAL		145	$1,643	---------->	$23,762

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

A. ANNUAL RECURRING (+/-) $64
(1) DISCOUNT FACTOR (TABLE A) 11.65
(2) DISCOUNTED SAVING/COST (3A X 3A1) $746

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

ITEM	SAVINGS(+) COST (-)(1)	YEAR OF OCCURRENCE(2)	DISCOUNT FACTOR(3)	DISCOUNTED SAVINGS(+) COST(-)(4)
a.	$			$
b.	$			$
c.	$			$
d. TOTAL	$			$

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+) / COST(-) (3A2+3Bd4) $746

D. PROJECT NON ENERGY QUALIFICATION TEST
(1) 25% MAX NON ENERGY CALC (2F5 X .33) $7,841
a IF 3D1 IS = OR > 3C GO TO ITEM 4
b IF 3D1 IS < 3C CALC SIR = (2F5+3D1)÷1F=
c IF 3D1b IS = > 1 GO TO ITEM 4
d IF 3D1b IS < 1 PROJECT DOES NOT QUALIFY

4. FIRST YEAR DOLLAR SAVINGS 2F3+3A+(3B1d ÷ YEARS ECONOMIC LIFE) $1,707

5. TOTAL NET DISCOUNTED SAVINGS (2F5+3C) $24,508

6. DISCOUNTED SAVINGS RATIO (IF < 1 PROJECT DOES NOT QUALIFY) (SIR)=(5÷1F)= 3.7

* MBTU=1,000,000 BTUs

Fig. 5

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: Fort Ord REGION NO. 9 PROJECT NUMBER 2

PROJECT TITLE Dining Facilities Energy Audit FISCAL YEAR 89

DISCRETE PORTION NAME Cost Savings Buildings #2563 and #2123.

ANALYSIS DATE 10-31-88 ECONOMIC LIFE 25 YEARS PREPARED BY Donald J. Romines

1. INVESTMENT

A. CONSTRUCTION COST	$ 10,864	
B. SIOH	$ 652	
C. DESIGN COST	$ 869	
D. ENERGY CREDIT CALC (1A+1B+1C)X.9	$ 11,147	
E. SALVAGE VALUE	-$	
F. TOTAL INVESTMENT (1D-1E)		$ 11,147

2. ENERGY SAVINGS (+) / COST (-)
ANALYSIS DATE ANNUAL SAVINGS, UNIT COST & DISCOUNTED SAVINGS

FUEL	* COST $/MBTU(1)	SAVINGS MBTU/YR(2)	ANNUAL $ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELEC	$ 17.87	16	$ 278	13.27	$ 3,689
B. DIST	$		$		$
C. RESID	$		$		$
D. NG	$ 4.99	261	$ 1,304	17.88	$ 23,316
E. COAL	$		$		$
F. TOTAL		277	$ 1,582		----------> $ 27,005

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

A. ANNUAL RECURRING (+/-) $ -0-

(1) DISCOUNT FACTOR (TABLE A) 11.65

(2) DISCOUNTED SAVING/COST (3A X 3A1) $

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

ITEM	SAVINGS(+) COST (-)(1)	YEAR OF OCCURRENCE(2)	DISCOUNT FACTOR(3)	DISCOUNTED SAVINGS(+) COST(-)(4)
a.	$			$
b.	$			$
c.	$			$
d. TOTAL	$			$

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

D. PROJECT NON ENERGY QUALIFICATION TEST

(1) 25% MAX NON ENERGY CALC (2F5 X .33) $ 8,912

a IF 3D1 IS = OR > 3C GO TO ITEM 4

b IF 3D1 IS < 3C CALC SIR = (2F5+3D1)÷1F= _____

c IF 3D1b IS = > 1 GO TO ITEM 4

d IF 3D1b IS < 1 PROJECT DOES NOT QUALIFY

4. FIRST YEAR DOLLAR SAVINGS 2F3+3A+(3B1d ÷ YEARS ECONOMIC LIFE) $ 1,582

5. TOTAL NET DISCOUNTED SAVINGS (2F5+3C) $ 27,005

6. DISCOUNTED SAVINGS RATIO (IF < 1 PROJECT DOES NOT QUALIFY) (SIR)=(5÷1F)= 2.4

* MBTU = 1,000,000 BTUs

Fig.6

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: Fort Ord REGION NO. 9 PROJECT NUMBER 3

PROJECT TITLE Dining Facilities Energy Audit FISCAL YEAR 89

DISCRETE PORTION NAME Cost Savings Buildings #4368 and #4260.

ANALYSIS DATE 10-31-88 ECONOMIC LIFE 25 YEARS PREPARED BY Donald J. Romines

1. INVESTMENT

A. CONSTRUCTION COST	$21,523	
B. SIOH	$ 1,291	
C. DESIGN COST	$ 1,722	
D. ENERGY CREDIT CALC (1A+1B+1C)X.9	$22,082	
E. SALVAGE VALUE	-$	
F. TOTAL INVESTMENT (1D-1E)		$22,082

2. ENERGY SAVINGS (+) / COST (-)
ANALYSIS DATE ANNUAL SAVINGS, UNIT COST & DISCOUNTED SAVINGS

FUEL	* COST $/MBTU(1)	SAVINGS MBTU/YR(2)	ANNUAL $ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELEC	$ 17.87	95	$ 1,690	13.27	$ 22,426
B. DIST	$		$		$
C. RESID	$		$		$
D. NG	$ 4.99	630	$ 3,142	17.88	$ 56,179
E. COAL	$		$		$
F. TOTAL		725	$ 4,832		->$ 78,605

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

A. ANNUAL RECURRING (+/-) $ 972
(1) DISCOUNT FACTOR (TABLE A) 11.65
(2) DISCOUNTED SAVING/COST (3A X 3A1) $ 11,324

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

ITEM	SAVINGS(+) COST (-)(1)	YEAR OF OCCURRENCE(2)	DISCOUNT FACTOR(3)	DISCOUNTED SAVINGS(+) COST(-)(4)
a.	$			$
b.	$			$
c.	$			$
d. TOTAL	$			$

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+) / COST(-) (3A2+3Bd4) $ 11,324

D. PROJECT NON ENERGY QUALIFICATION TEST
(1) 25% MAX NON ENERGY CALC (2F5 X .33) $ 25,940
a IF 3D1 IS = OR > 3C GO TO ITEM 4
b IF 3D1 IS < 3C CALC SIR = (2F5+3D1)÷1F= ____
c IF 3D1b IS = > 1 GO TO ITEM 4
d IF 3D1b IS < 1 PROJECT DOES NOT QUALIFY

4. FIRST YEAR DOLLAR SAVINGS 2F3+3A+(3B1d ÷ YEARS ECONOMIC LIFE) $ 5,804

5. TOTAL NET DISCOUNTED SAVINGS (2F5+3C) $ 89,929

6. DISCOUNTED SAVINGS RATIO (IF < 1 PROJECT DOES NOT QUALIFY) (SIR)=(5÷1F)= 4.1

* MBTU = 1,000,000 BTU

Fig. 7

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: Presidio of Monterey REGION NO. 9 PROJECT NUMBER 4

PROJECT TITLE Dining Facilities Energy Audit FISCAL YEAR 89

DISCRETE PORTION NAME Cost Savings Buildings #627, 629, and 630.

ANALYSIS DATE 10-31-88 ECONOMIC LIFE 25 YEARS PREPARED BY Donald J. Romines

1. INVESTMENT

A. CONSTRUCTION COST	$ 46,958	
B. SIOH	$ 2,817	
C. DESIGN COST	$ 3,757	
D. ENERGY CREDIT CALC (1A+1B+1C)X.9	$ 48,178	
E. SALVAGE VALUE	-$	
F. TOTAL INVESTMENT (1D-1E)		$ 48,178

2. ENERGY SAVINGS (+) / COST (-)
ANALYSIS DATE ANNUAL SAVINGS, UNIT COST & DISCOUNTED SAVINGS

FUEL	* COST $/MBTU(1)	SAVINGS MBTU/YR(2)	ANNUAL $ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELEC	$ 18.93	123	$ 2,328	13.27	$ 30,898
B. DIST	$		$		$
C. RESID	$		$		$
D. NG	$ 5.25	1,530	$ 8,031	17.88	$ 143,594
E. COAL	$		$		$
F. TOTAL		1,653	$ 10,359	---------->	$ 174,492

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

A. ANNUAL RECURRING (+/-) $ 776
(1) DISCOUNT FACTOR (TABLE A) 11.65
(2) DISCOUNTED SAVING/COST (3A X 3A1) $ 9,040

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

ITEM	SAVINGS(+) COST (-)(1)	YEAR OF OCCURRENCE(2)	DISCOUNT FACTOR(3)	DISCOUNTED SAVINGS(+) COST(-)(4)
a.	$			$
b.	$			$
c.	$			$
d. TOTAL	$			$

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+) / COST(-) (3A2+3Bd4) $ 9,040

D. PROJECT NON ENERGY QUALIFICATION TEST
(1) 25% MAX NON ENERGY CALC (2F5 X .33) $ 63,685
a IF 3D1 IS = OR > 3C GO TO ITEM 4
b IF 3D1 IS < 3C CALC SIR = (2F5+3D1)÷1F= ____
c IF 3D1b IS = > 1 GO TO ITEM 4
d IF 3D1b IS < 1 PROJECT DOES NOT QUALIFY

4. FIRST YEAR DOLLAR SAVINGS 2F3+3A+(3B1d ÷ YEARS ECONOMIC LIFE) $ 11,135

5. TOTAL NET DISCOUNTED SAVINGS (2F5+3C) $ 183,532

6. DISCOUNTED SAVINGS RATIO (IF < 1 PROJECT DOES NOT QUALIFY) (SIR)=(5÷1F)= 3.8

* MBTU=1,000,000 BTUs

Fig. 8

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: Fort Ord REGION NO. 9 PROJECT NUMBER 5

PROJECT TITLE Dining Facilities Energy Audit FISCAL YEAR 89

DISCRETE PORTION NAME Cost Savings Buildings #3585, 3641, 4453, 4455,4468,495

ANALYSIS DATE 10-31-88 ECONOMIC LIFE 25 YEARS PREPARED BY Donald J. Romines

1. INVESTMENT

A. CONSTRUCTION COST	$ 78,787	
B. SIOH	$ 4,727	
C. DESIGN COST	$ 6,303	
D. ENERGY CREDIT CALC (1A+1B+1C)X.9	$ 80,835	
E. SALVAGE VALUE	-$	
F. TOTAL INVESTMENT (1D-1E)		$ 80,835

2. ENERGY SAVINGS (+) / COST (-)
ANALYSIS DATE ANNUAL SAVINGS, UNIT COST & DISCOUNTED SAVINGS

FUEL	* COST $/MBTU(1)	SAVINGS MBTU/YR(2)	ANNUAL $ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELEC	$ 17.87	302	$ 5,397	13.27	$ 71,615
B. DIST	$		$		$
C. RESID	$		$		$
D. NG	$ 4.99	2,091	$ 10,432	17.88	$ 186,524
E. COAL	$		$		$
F. TOTAL		2,393	$ 15,829	---------->	$ 258,139

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

A. ANNUAL RECURRING (+/-) $ 2,448
(1) DISCOUNT FACTOR (TABLE A) 11.65
(2) DISCOUNTED SAVING/COST (3A X 3A1) $ 28,520

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

ITEM	SAVINGS(+) COST (-)(1)	YEAR OF OCCURRENCE(2)	DISCOUNT FACTOR(3)	DISCOUNTED SAVINGS(+) COST(-)(4)
a.	$			$
b.	$			$
c.	$			$
d. TOTAL	$			$

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+) / COST(-) (3A2+3Bd4) $ 28,520

D. PROJECT NON ENERGY QUALIFICATION TEST
(1) 25% MAX NON ENERGY CALC (2F5 X .33) $ 89,408
a IF 3D1 IS = OR > 3C GO TO ITEM 4
b IF 3D1 IS < 3C CALC SIR = (2F5+3D1)÷1F= _____
c IF 3D1b IS = > 1 GO TO ITEM 4
d IF 3D1b IS < 1 PROJECT DOES NOT QUALIFY

4. FIRST YEAR DOLLAR SAVINGS 2F3+3A+(3B1d ÷ YEARS ECONOMIC LIFE) $ 18,277

5. TOTAL NET DISCOUNTED SAVINGS (2F5+3C) $ 286,659

6. DISCOUNTED SAVINGS RATIO (IF < 1 PROJECT DOES NOT QUALIFY) (SIR)=(5÷1F)= 3.5

* MBTU=1,000,000 BTUs