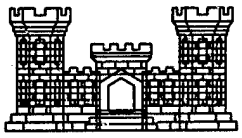
# Limited Energy Study of Facilities in the Historic, Red Brick Main Post Area at Fort Bragg, North Carolina

*Final Report*

*Volume 2 of 2*

CONTRACT #DACA01-94-D-0034
DELIVERY ORDER 0005
SYSTEMS CORP PROJECT #94013.05

April 28, 1995



Savannah District-
US Army Corps
of Engineers



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Marie Wakefield,
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This section contains the life-cycle cost analyses, energy calculations, and cost estimates for ECO-3: Water Conservation Improvement. For this ECO, four different options were considered. These options include:

1. Water-Saving Toilets
2. Water-Saving Urinals
3. Spring-Loaded Faucets
4. Water-Saving Showerheads

A single life-cycle cost analysis and cost estimate was performed for each of the four options which grouped all buildings together. A single life-cycle cost analysis was performed combining all four options as well.

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# LIFE CYCLE COST ANALYSIS SUMMARY
# FEDERAL ENERGY MANAGEMENT PROGRAM (FEMP)

| | |
|---|---|
| **DISCRETE PORTION NAME:** | Fort Bragg, NC |
| **PROJECT NAME:** | Water Conservation Project in Historic Red Brick Area |
| **TOTAL INVESTMENT:** | $101,301 |
| **MBTU/YEAR SAVED:** | 7,806 |
| **DISCOUNTED ENERGY SAVINGS:** | $814,496 |
| **DISCOUNTED DEMAND SAVINGS:** | 0 |
| **TOTAL ENERGY SAVINGS:** | $814,496 |
| **TOTAL NON-ENERGY SAVINGS:** | $98,059 |
| **FIRST YEAR DOLLAR SAVINGS:** | $50,451 |
| **SIMPLE PAYBACK IN YEARS:** | 2.01 |
| **TOTAL NET SAVINGS:** | $912,555 |
| **SAVINGS TO INVESTMENT RATIO:** | 9.01 |

**REQUIREMENT:**
This project requires replacement of high-volume toilets and urinals with water saving toilets (1.6 gal/flush for tank type, 3.5 gal/flush for flush type) and water-saving urinals (1.0 gal/flush). Also required is a retrofit of existing high-volume faucets and showerheads with water saving spring-loaded faucets and water savings showerheads. Upon completing this water-conservation project Fort Bragg will save 2287 MWH of energy and save $50,451 annually which will help Fort Bragg meet the requirements of the Energy Policy Act of 1992 (PL 102-486). This act states that Fort Bragg must achieve a 30% reduction in its energy consumption from FY 1985 to the FY 2005.

**DESCRIPTION OF PROPOSED CONSTRUCTION:**
This project consists of installing water-saving urinals, spring-loaded faucets and water-saving showerheads.

**CURRENT CONDITIONS:**
Approximately $50,451 in energy and water is wasted each year at Fort Bragg by continuing to use old-technology water-consuming devices. At this rate a more efficient system would pay for itself in approximately 2.01 years.

**IMPACT IF NOT PROVIDED:**
If this project is not funded, Fort Bragg will continue to spend in additional utility and operating costs over the next 2.01 years enough to purchase the more efficient water-conserving products. Also, if this project is not funded, Fort Bragg will have more difficulty meeting the mandates of the Energy Policy Act of 1992(PL 102-486).

# ECO - 3:

# WATER CONSERVATION PROJECTS

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: ECO3
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 ECO 3 : WATER CONSERVATION OPPORTUNITIES
FISCAL YEAR 95 DISCRETE PORTION NAME: COMBINED ECO S
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 92091. | | |
| B. SIOH | $ 4605. | | |
| C. DESIGN COST | $ 4605. | | |
| D. TOTAL COST (1A+1B+1C) | $ 101301. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 101301. |

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

| FUEL | UNIT COST $/ MWH(1) | SAVINGS MWH/YR(2) | ANNUAL $ SAVINGS(3) | DISCOUNT FACTOR(4) | DISCOUNTED SAVINGS(5) |
|---|---|---|---|---|---|
| A. ELECT | $ 34.95 | 0. | $ 0. | 15.08 | $ 0. |
| B. DIST | $ 19.18 | 2287. | $ 43861. | 18.57 | $ 814496. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | 0. | $ 0. | 18.58 | $ 0. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 2287. | $ 43861. | | $ 814496. |

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

| | | |
|---|---|---|
| A. ANNUAL RECURRING (+/-) | | $ 6590. |
| (1) DISCOUNT FACTOR (TABLE A) | 14.88 | |
| (2) DISCOUNTED SAVING/COST (3A X 3A1) | | $ 98059. |

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) | $ 98059. |
| 4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) | $ 50451. |
| 5. SIMPLE PAYBACK PERIOD (1G/4) | 2.01 YEARS |
| 6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) | $ 912555. |
| 7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= (IF < 1 PROJECT DOES NOT QUALIFY) | 9.01 |
| 8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): | 14.97 % |

# ECO - 3A:

# WATER - SAVING TOILETS

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: ECO3
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 ECO 3 : WATER CONSERVATION OPPORTUNITIES
FISCAL YEAR 95 DISCRETE PORTION NAME: WATER CLOSETS
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 13556. | | |
| B. SIOH | $ 678. | | |
| C. DESIGN COST | $ 678. | | |
| D. TOTAL COST (1A+1B+1C) | $ 14912. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 14912. |

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

| FUEL | UNIT COST $/ MWH(1) | SAVINGS MWH/YR(2) | ANNUAL $ SAVINGS(3) | DISCOUNT FACTOR(4) | DISCOUNTED SAVINGS(5) |
|---|---|---|---|---|---|
| A. ELECT | $ 34.95 | 0. | $ 0. | 15.08 | $ 0. |
| B. DIST | $ 19.18 | 0. | $ 0. | 18.57 | $ 0. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | 0. | $ 0. | 18.58 | $ 0. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 0. | $ 0. | | $ 0. |

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

| | | |
|---|---|---|
| A. ANNUAL RECURRING (+/-) | | $ 1721. |
| (1) DISCOUNT FACTOR (TABLE A) | 14.88 | |
| (2) DISCOUNTED SAVING/COST (3A X 3A1) | | $ 25608. |

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) $ 25608.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) $ 1721.

5. SIMPLE PAYBACK PERIOD (1G/4) 8.66 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) $ 25608.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 1.72
(IF < 1 PROJECT DOES NOT QUALIFY)
**** Project does not qualify for ECIP funding; 4,5,6 for information only.

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): N/A

WATER CLOSETS

| BUILDING | L/FLUSH EXISTING | L/FLUSH PROPOSED | NUMBER OF USERS | FIXTURE QUANTITY | DAYS / YEAR | FLUSHES / DAY | ANNUAL WATER SAVINGS | ANNUAL DOLLAR SAVINGS | INITIAL COST [$] |
|---|---|---|---|---|---|---|---|---|---|
| 1105 | 17.03 | 13.25 | 127 | 16 | 365 | 508 | 701815 | $226.34 | $969.00 |
| 1120 | 17.03 | 13.25 | 195 | 21 | 250 | 780 | 738075 | $238.03 | $1,271.00 |
| 1127 | 17.03 | 13.25 | 175 | 33 | 250 | 700 | 662375 | $213.62 | $1,997.00 |
| 1133 | 17.03 | 13.25 | 90 | 12 | 250 | 360 | 340650 | $109.86 | $727.00 |
| 1138 | 17.03 | 13.25 | 180 | 15 | 365 | 720 | 994698 | $320.79 | $908.00 |
| 1242 | 17.03 | 13.25 | 60 | 6 | 365 | 240 | 331566 | $106.93 | $363.00 |
| 1326 | 17.03 | 13.25 | 67 | 15 | 250 | 268 | 253595 | $81.78 | $908.00 |
| 1333 | 17.03 | 13.25 | 25 | 4 | 250 | 100 | 94625 | $30.52 | $242.00 |
| 1434 | 17.03 | 13.25 | 25 | 6 | 250 | 100 | 94625 | $30.52 | $363.00 |
| 1549 | 17.03 | 13.25 | 13 | 6 | 250 | 52 | 49205 | $15.87 | $363.00 |
| 1728 | 17.03 | 13.25 | 100 | 36 | 250 | 400 | 378500 | $122.07 | $2,178.00 |
| 1731 | 17.03 | 13.25 | 126 | 54 | 365 | 504 | 696289 | $224.55 | $3,267.00 |
| | | | | | | | | $1,720.87 | $13,556.00 |

# ECO - 3B:

# WATER - SAVING

# URINALS

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: ECO3
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 ECO 3 : WATER CONSERVATION OPPORTUNITIES
FISCAL YEAR 95 DISCRETE PORTION NAME: URINALS
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 6564. | | |
| B. SIOH | $ 328. | | |
| C. DESIGN COST | $ 328. | | |
| D. TOTAL COST (1A+1B+1C) | $ 7220. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 7220. |

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

| FUEL | UNIT COST $/ MWH(1) | SAVINGS MWH/YR(2) | ANNUAL $ SAVINGS(3) | DISCOUNT FACTOR(4) | DISCOUNTED SAVINGS(5) |
|---|---|---|---|---|---|
| A. ELECT | $ 34.95 | 0. | $ 0. | 15.08 | $ 0. |
| B. DIST | $ 19.18 | 0. | $ 0. | 18.57 | $ 0. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | 0. | $ 0. | 18.58 | $ 0. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 0. | $ 0. | | $ 0. |

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

| | | |
|---|---|---|
| A. ANNUAL RECURRING (+/-) | | $ 757. |
| (1) DISCOUNT FACTOR (TABLE A) | 14.88 | |
| (2) DISCOUNTED SAVING/COST (3A X 3A1) | | $ 11264. |

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) | $ 11264. |
| 4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) | $ 757. |
| 5. SIMPLE PAYBACK PERIOD (1G/4) | 9.54 YEARS |
| 6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) | $ 11264. |
| 7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= | 1.56 |

(IF < 1 PROJECT DOES NOT QUALIFY)
**** Project does not qualify for ECIP funding; 4,5,6 for information only.

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): N/A

URINALS

| BUILDING | L/FLUSH EXISTING | L/FLUSH PROPOSED | NUMBER OF USERS | FIXTURE QUANITY | DAYS / YEAR | FLUSHES / DAY | ANNUAL WATER SAVINGS | ANNUAL DOLLAR SAVINGS | INITIAL COST [$] |
|---|---|---|---|---|---|---|---|---|---|
| 1105 | 5.68 | 3.79 | 127 | 9 | 365 | 508 | 350907 | $113.17 | $579.00 |
| 1120 | 5.68 | 3.79 | 125 | 6 | 250 | 500 | 236563 | $76.29 | $387.00 |
| 1127 | 5.68 | 3.79 | 125 | 12 | 250 | 500 | 236563 | $76.29 | $773.00 |
| 1133 | 5.68 | 3.79 | 40 | 3 | 250 | 160 | 75700 | $24.41 | $192.00 |
| 1138 | 5.68 | 3.79 | 180 | 18 | 365 | 720 | 497349 | $160.40 | $1,158.00 |
| 1242 | 5.68 | 3.79 | 60 | 3 | 365 | 240 | 165783 | $53.47 | $192.00 |
| 1326 | 5.68 | 3.79 | 67 | 6 | 250 | 268 | 126798 | $40.89 | $387.00 |
| 1333 | 5.68 | 3.79 | 25 | 2 | 250 | 100 | 47313 | $15.26 | $129.00 |
| 1434 | 5.68 | 3.79 | 25 | 1 | 250 | 100 | 47313 | $15.26 | $64.00 |
| 1549 | 5.68 | 3.79 | 13 | 6 | 250 | 52 | 24603 | $7.93 | $387.00 |
| 1728 | 5.68 | 3.79 | 100 | 18 | 250 | 400 | 189250 | $61.03 | $1,158.00 |
| 1731 | 5.68 | 3.79 | 126 | 18 | 365 | 504 | 348144 | $112.28 | $1,158.00 |
| | | | | | | | 756.7 | | $6,564.00 |

# ECO - 3C:

# SPRING - LOADED

# FAUCETS

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: ECO3
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 ECO 3 : WATER CONSERVATION OPPORTUNITIES
FISCAL YEAR 95 DISCRETE PORTION NAME: SPRING LOADED FAUCETS
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 68179. | | |
| B. SIOH | $ 3409. | | |
| C. DESIGN COST | $ 3409. | | |
| D. TOTAL COST (1A+1B+1C) | $ 74997. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 74997. |

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

| FUEL | UNIT COST $/ MWH(1) | SAVINGS MWH/YR(2) | ANNUAL $ SAVINGS(3) | DISCOUNT FACTOR(4) | DISCOUNTED SAVINGS(5) |
|---|---|---|---|---|---|
| A. ELECT | $ 34.95 | 0. | $ 0. | 15.08 | $ 0. |
| B. DIST | $ 19.18 | 122. | $ 2330. | 18.57 | $ 43275. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | 0. | $ 0. | 18.58 | $ 0. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 122. | $ 2330. | | $ 43275. |

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

| | | |
|---|---|---|
| A. ANNUAL RECURRING (+/-) | | $ 275. |
| (1) DISCOUNT FACTOR (TABLE A) | 14.88 | |
| (2) DISCOUNTED SAVING/COST (3A X 3A1) | | $ 4092. |

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) | $ 4092. |
| 4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) | $ 2605. |
| 5. SIMPLE PAYBACK PERIOD (1G/4) | 28.79 YEARS |
| 6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) | $ 47367. |
| 7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= (IF < 1 PROJECT DOES NOT QUALIFY) | .63 |
| 8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): | .66 % |

INSTALL SPRING LOADED FAUCETS

| BUILDING | DAYS / YEAR | FIXTURE QUANTITY | NUMBER OF USERS | FLOW RATE [L/MIN] | CURRENT USE [L/YR] | PROPOSED USE [L/YR] | WATER SAVINGS [L/YR] | WATER SAVINGS [$/YR] | OIL SAVINGS [MW-HR/YR] | INITIAL COST [$] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1105 | 365 | 20 | 127 | 9.5 | 550466 | 438518 | 111947 | $36.10 | 16.0 | 5088 |
| 1120 | 250 | 25 | 195 | 9.5 | 578906 | 461175 | 117731 | $37.97 | 16.8 | 6360 |
| 1127 | 250 | 33 | 175 | 9.5 | 519531 | 413875 | 105656 | $34.07 | 15.1 | 8395 |
| 1133 | 250 | 12 | 90 | 9.5 | 267188 | 212850 | 54338 | $17.52 | 7.8 | 3052 |
| 1138 | 365 | 43 | 180 | 9.5 | 780188 | 621522 | 158666 | $51.17 | 22.6 | 10939 |
| 1242 | 365 | 6 | 60 | 9.5 | 260063 | 207174 | 52889 | $17.06 | 7.5 | 1527 |
| 1326 | 250 | 17 | 67 | 9.5 | 198906 | 158455 | 40451 | $13.05 | 5.8 | 4326 |
| 1333 | 250 | 3 | 25 | 9.5 | 74219 | 59125 | 15094 | $4.87 | 2.2 | 763 |
| 1434 | 250 | 3 | 25 | 9.5 | 74219 | 59125 | 15094 | $4.87 | 2.2 | 763 |
| 1549 | 250 | 7 | 13 | 9.5 | 38594 | 30745 | 7849 | $2.53 | 1.1 | 1781 |
| 1728 | 250 | 45 | 100 | 9.5 | 296875 | 236500 | 60375 | $19.47 | 8.6 | 11448 |
| 1731 | 365 | 54 | 126 | 9.5 | 546131 | 435065 | 111066 | $35.82 | 15.8 | 13737 |
| | | | | | | | | $274.50 | 121.5 | $68,179.00 |

# ECO - 3D:

# WATER - SAVING

# SHOWERHEADS

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: ECO3
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 ECO 3 : WATER CONSERVATION OPPORTUNITIES
FISCAL YEAR 95 DISCRETE PORTION NAME: LOW FLOW SHOWERHEADS
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 3792. | | |
| B. SIOH | $ 190. | | |
| C. DESIGN COST | $ 190. | | |
| D. TOTAL COST (1A+1B+1C) | $ 4172. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 4172. |

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

| FUEL | UNIT COST $/ MWH(1) | SAVINGS MWH/YR(2) | ANNUAL $ SAVINGS(3) | DISCOUNT FACTOR(4) | DISCOUNTED SAVINGS(5) |
|---|---|---|---|---|---|
| A. ELECT | $ 34.95 | 0. | $ 0. | 15.08 | $ 0. |
| B. DIST | $ 19.18 | 2165. | $ 41530. | 18.57 | $ 771221. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | 0. | $ 0. | 18.58 | $ 0. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 2165. | $ 41530. | | $ 771221. |

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

| | | |
|---|---|---|
| A. ANNUAL RECURRING (+/-) | | $ 3837. |
| (1) DISCOUNT FACTOR (TABLE A) | 14.88 | |
| (2) DISCOUNTED SAVING/COST (3A X 3A1) | | $ 57095. |

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) | $ 57095. |
| 4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) | $ 45367. |
| 5. SIMPLE PAYBACK PERIOD (1G/4) | .09 YEARS |
| 6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) | $ 828315. |
| 7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= (IF < 1 PROJECT DOES NOT QUALIFY) | 198.54 |
| 8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): | 34.19 % |

INSTALL LOW FLOW SHOWER HEADS

| BUILDING | DAYS / YEAR | FIXTURE QUANTITY | NUMBER OF USERS | FLOW RATE [L/MIN] | CURRENT USE [L/YR] | PROPOSED USE [L/YR] | WATER SAVINGS [L/YR] | WATER SAVINGS [$/YR] | OIL SAVINGS [MW-HR/YR] |
|---|---|---|---|---|---|---|---|---|---|
| 1105 | 365 | 14 | 127 | 9.5 | 3522980 | 3522980 | 0 | $0.00 | 0.0 |
| 1120 | 250 | 6 | 20 | 9.5 | 380000 | 380000 | 0 | $0.00 | 0.0 |
| 1127 | 250 | 6 | 20 | 9.5 | 380000 | 380000 | 0 | $0.00 | 0.0 |
| 1133 | 250 | 2 | 4 | 27.4 | 219200 | 76000 | 143200 | $46.18 | 26.1 |
| 1138 | 365 | 20 | 180 | 28.4 | 14927040 | 4993200 | 9933840 | $3,203.66 | 1808.0 |
| 1242 | 365 | 4 | 60 | 17 | 2978400 | 1664400 | 1314000 | $423.77 | 239.1 |
| 1326 | 250 | 11 | 22 | 17.4 | 765600 | 418000 | 347600 | $112.10 | 63.3 |
| 1333 | 250 | 0 | 0 | 0 | 0 | 0 | 0 | $0.00 | 0.0 |
| 1434 | 250 | 0 | 0 | 0 | 0 | 0 | 0 | $0.00 | 0.0 |
| 1549 | 250 | 0 | 0 | 0 | 0 | 0 | 0 | $0.00 | 0.0 |
| 1728 | 250 | 3 | 6 | 22.7 | 272400 | 114000 | 158400 | $51.08 | 28.8 |
| 1731 | 365 | 42 | 126 | 9.5 | 3495240 | 3495240 | 0 | $0.00 | 0.0 |
| | | | | | | | | $3,836.80 | 2165.3 |

| INITIAL COST [$] |
| --- |
| |
| |
| |
| 190 |
| 1897 |
| 379 |
| 1042 |
| |
| |
| |
| 284 |
| |

$3,792.00

This section contains the life-cycle cost analyses, energy calculations, and cost estimates for ECO-4: Install New Gas Heating Systems.

A single life-cycle cost analysis and cost estimate was performed for each building.

# TABLE OF CONTENTS

# LIFE CYCLE COST ANALYSIS SUMMARY
# FEDERAL ENERGY MANAGEMENT PROGRAM (FEMP)

| | |
|---|---|
| DISCRETE PORTION NAME: | Fort Bragg, NC |
| PROJECT NAME: | Replace Oil Heat with Natural Gas Heat in Historic Red Brick Area |
| TOTAL INVESTMENT: | $376,059 |
| MBTU/YEAR SAVED: | 3,754 |
| DISCOUNTED ENERGY SAVINGS: | $1,199,337 |
| DISCOUNTED DEMAND SAVINGS: | 0 |
| TOTAL ENERGY SAVINGS: | $1,199,337 |
| TOTAL NON-ENERGY SAVINGS: | $155,400 |
| FIRST YEAR DOLLAR SAVINGS: | $74,725 |
| SIMPLE PAYBACK IN YEARS: | 5.03 |
| TOTAL NET SAVINGS: | $1,354,737 |
| SAVINGS TO INVESTMENT RATIO: | 3.6 |

ECO 4

REQUIREMENT:
This project requires installing new natural gas boilers to replace oil-fired boilers in nine buildings in the Historic Red Brick Area. Also included is the use of natural gas-fired infrared heaters in the high bay areas of Shop Building 2-1549 to replace existing unit heaters. The project requires extension of a six-inch gas main located about 500 feet from the vicinity. The completion of this project at Fort Bragg will save 1100 MWH of energy and save $74,725 annually which will help Fort Bragg meet the requirements of the Energy Policy Act of 1992 (PL 102-486). This act states that Fort Bragg must achieve a 30% reduction in its energy consumption from FY 1985 to the FY 2005.

DESCRIPTION OF PROPOSED CONSTRUCTION:
This project consists of replacing oil-fired boilers with new natural gas boilers in nine buildings and replacing unit heaters with natural gas-fired infrared heaters in bldg 2-1549.

CURRENT CONDITIONS:
The energy lost due to the current usage of inefficient oil-fired heating systems is in excess of 1100 MWH per year at a cost of $74,725 per year. At this rate a more energy efficient heating system would pay for itself in approximately 3.6 years.

IMPACT IF NOT PROVIDED:
If this project is not funded, Fort Bragg will continue to spend in additional utility and operating costs over the next 3.6 years enough to purchase the more efficient heating system. Also, if this project is not funded, Fort Bragg will have more difficulty meeting the mandates of the Energy Policy Act of 1992(PL 102-486).

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: ECO4
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 ECO 4 REPLACE OIL HEAT WITH NATURAL GAS
FISCAL YEAR 95 DISCRETE PORTION NAME: ECO4-TOTAL
ANALYSIS DATE: 04-19-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 347819. | | |
| B. SIOH | $ 14120. | | |
| C. DESIGN COST | $ 14120. | | |
| D. TOTAL COST (1A+1B+1C) | $ 376059. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 376059. |

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

| FUEL | UNIT COST $/ MWH(1) | SAVINGS MWH/YR(2) | ANNUAL $ SAVINGS(3) | DISCOUNT FACTOR(4) | DISCOUNTED SAVINGS(5) |
|---|---|---|---|---|---|
| A. ELECT | $ 34.95 | 13. | $ 454. | 15.08 | $ 6852. |
| B. DIST | $ 19.18 | 8665. | $ 166195. | 18.57 | $ 3086236. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | -7578. | $ -101924. | 18.58 | $ -1893750. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 1100. | $ 64725. | | $ 1199337. |

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

A. ANNUAL RECURRING (+/-) — $ 5000.
(1) DISCOUNT FACTOR (TABLE A) — 14.88
(2) DISCOUNTED SAVING/COST (3A X 3A1) — $ 74400.

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

| ITEM | SAVINGS(+) COST(-) (1) | YR OC (2) | DISCNT FACTR (3) | DISCOUNTED SAVINGS(+)/ COST(-)(4) |
|---|---|---|---|---|
| 1. FUEL OIL TANK | $ 100000. | 7 | .81 | 81000. |
| d. TOTAL | $ 100000. | | | 81000. |

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4) $ 155400.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) $ 74725.

5. SIMPLE PAYBACK PERIOD (1G/4) — 5.03 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) — $ 1354737.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= — 3.60
(IF < 1 PROJECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): — 9.82 %

# GAS MAIN EXTENSION COST ESTIMATE

Estimate: RED BRICK AREA Date: 03-Jan-95
Description: COST ESTIMATE (100% OF REQ'D 4" MAIN)
Project: LIMITED EEAP(RDBRKBid Date:
Location: FORT BRAGG, N.C. Job #: 94013.05
Sq. footage: MAIN GAS LINE City indx:Raleigh, NC

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 0205541750 | PAVEMENT REMOVAL, BITUMINOUS, 4" TO 6" THICK | | | | | 270.00 S.Y. | |
| | Unit values | 0.10 | 0.00 | 1.73 | 2.50 | 0.00 | 4.23 |
| | Totals | 25.65 | $0 | $466 | $676 | $0 | $1,142 |
| 0222541900 | TAMPING TRENCH B'FILL, VIBRATING PLATE, ADD | | | | | 45.00 C.Y. | |
| | Unit values | 0.09 | 0.00 | 1.44 | 0.55 | 0.00 | 1.99 |
| | Totals | 4.01 | $0 | $65 | $25 | $0 | $90 |
| 0222582800 | TRENCH EXCVTNG 40HP CHNTRNCHR&BKFL 12"W24"D | | | | | 2400.00 L.F. | |
| | Unit values | 0.01 | 0.00 | 0.20 | 0.20 | 0.00 | 0.39 |
| | Totals | 24.00 | $0 | $470 | $470 | $0 | $940 |
| 0222700500 | HORZ BORNG >100' RRWK .5"WALL 24"DIA CASING | | | | | 100.00 L.F. | |
| | Unit values | 9.14 | 42.93 | 165.09 | 125.10 | 0.00 | 333.12 |
| | Totals | 914.30 | $4,293 | $16,509 | $12,510 | $0 | $33,312 |
| 0251040160 | ASPHALTIC CONCRETE PAVEMENT, PAVING, BINDER COURSE, 3" THICK | | | | | 270.00 S.Y. | |
| | Unit values | 0.02 | 3.98 | 0.31 | 0.28 | 0.00 | 4.58 |
| | Totals | 4.86 | $1,074 | $85 | $76 | $0 | $1,235 |
| 0251040340 | ASPHALTIC CONCRETE PAVEMENT, PAVING, WEARING COURSE, 1-1/2" THICK | | | | | 270.00 S.Y. | |
| | Unit values | 0.01 | 2.20 | 0.22 | 0.20 | 0.00 | 2.63 |
| | Totals | 3.24 | $594 | $60 | $55 | $0 | $709 |
| 0260120200 | BEDDING, FOR PIPE IN TRENCH SAND, DEAD OR BANK | | | | | 45.00 C.Y. | |
| | Unit values | 0.16 | 3.79 | 2.79 | 1.13 | 0.00 | 7.71 |
| | Totals | 7.20 | $170 | $126 | $51 | $0 | $347 |
| 0260120500 | BEDDING, PLACING IN TRENCH | | | | | 45.00 C.Y. | |
| | Unit values | 0.09 | 0.00 | 1.44 | 0.55 | 0.00 | 1.99 |
| | Totals | 4.01 | $0 | $65 | $25 | $0 | $90 |
| 0266907800 | CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER | | | | | 1.00 Ea. | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Unit values | 1.56 | 404.00 | 29.36 | 4.89 | 0.00 | 438.25 |
| Totals | 1.56 | $404 | $29 | $5 | $0 | $438 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 0268520350 | GAS SERVICE & DISTRIB PIPINGPOLYETHYLENE,60P-SI 4"DIA,SDR11,CPLG@40FT | | | | 2400.00 | L.F. |
| Unit values | 0.11 | 3.79 | 2.03 | 0.34 | 0.00 | 6.15 |
| Totals | 259.20 | $9,090 | $4,861 | $817 | $0 | $14,768 |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| U02 SITEWORK | | 1249 | $15,625 | $22,736 | $14,710 | $0 | $53,071 |
| 1562600142 | GAS APPLIANCE REGULATORS DOUBLE DIAPHRAGM TYPE 4" PIPE SIZE | | | | | 1.00 Ea. | |
| Unit values | | 2.00 | 1448.55 | 30.86 | 0.00 | 0.00 | 1479.41 |
| Totals | | 2.00 | $1,449 | $31 | $0 | $0 | $1,480 |
| U15 MECHANICAL | | 2 | $1,449 | $31 | $0 | $0 | $1,480 |

| Line # Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| ESTIMATE TOTAL | 1251 | $17,074 | $22,767 | $14,710 | $0 | $54,551 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 0.00% | | $0 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 0.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $17,074 | $22,767 | $14,710 | $0 | $54,551 |
| CONTINGENCY | 10.00% | | | | | $5,455 |
| BOND | 0.00% | | | | | $0 |
| PROFIT | 10.00% | | | | | $5,455 |
| JOB TOTAL | | | | | | $65,461 |

Estimate: RED BRICK AREA Date: 03-Jan-95
Description: COST ESTIMATE (100% OF REQ'D 4" MAIN)
Project: LIMITED EEAP(RDBRKBid Date:
Location: FORT BRAGG, N.C. Job #: 94013.05
Sq. footage: MAIN GAS LINE City indx:Raleigh, NC

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U02 SITEWORK | 1249 | $15,625 | $22,736 | $14,710 | $0 | $53,071 |
| U15 MECHANICAL | 2 | $1,449 | $31 | $0 | $0 | $1,480 |
| TOTAL | 1251 | $17,074 | $22,767 | $14,710 | $0 | $54,551 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 0.00% | | $0 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 0.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $17,074 | $22,767 | $14,710 | $0 | $54,551 |
| CONTINGENCY | 10.00% | | | | | $5,455 |
| BOND | 0.00% | | | | | $0 |
| PROFIT | 10.00% | | | | | $5,455 |
| JOB TOTAL | | | | | | $65,461 |

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: ECO4
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 ECO 4 REPLACE OIL HEAT WITH NATURAL GAS
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 1-1242
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 24679. | | |
| B. SIOH | $ 907. | | |
| C. DESIGN COST | $ 907. | | |
| D. TOTAL COST (1A+1B+1C) | $ 26493. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 26493. |

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

| FUEL | UNIT COST $/ MWH(1) | SAVINGS MWH/YR(2) | ANNUAL $ SAVINGS(3) | DISCOUNT FACTOR(4) | DISCOUNTED SAVINGS(5) |
|---|---|---|---|---|---|
| A. ELECT | $ 34.95 | 0. | $ 0. | 15.08 | $ 0. |
| B. DIST | $ 19.18 | 389. | $ 7466. | 18.57 | $ 138647. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | -359. | $ -4833. | 18.58 | $ -89797. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 30. | $ 2633. | | $ 48850. |

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

A. ANNUAL RECURRING (+/-) $ 500.
(1) DISCOUNT FACTOR (TABLE A) 14.88
(2) DISCOUNTED SAVING/COST (3A X 3A1) $ 7440.

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

| ITEM | SAVINGS(+) COST(-) (1) | YR OC (2) | DISCNT FACTR (3) | DISCOUNTED SAVINGS(+)/ COST(-)(4) |
|---|---|---|---|---|
| 1. FUEL OIL TANK | $ 10000. | 7 | .81 | 8100. |
| d. TOTAL | $ 10000. | | | 8100. |

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4) $ 15540.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) $ 3633.

5. SIMPLE PAYBACK PERIOD (1G/4) 7.29 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) $ 64390.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 2.43
(IF < 1 PROJECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): 7.68 %

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 68.66 | 1328.59 |
| SPACE COOL | 310.70 | 0.00 |
| HVAC AUX | 369.70 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 622.17 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 242.60 | 0.00 |
| TOTAL | 1613.84 | 1328.59 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 3048.69 MBTU | 158.5 KBTU/SQFT-YR GROSS-AREA | 158.5 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 6494.06 MBTU | 337.5 KBTU/SQFT-YR GROSS-AREA | 337.5 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.0
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | NATURAL-GAS |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 68.66 | 1226.39 |
| SPACE COOL | 310.70 | 0.00 |
| HVAC AUX | 369.70 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 622.17 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 242.60 | 0.00 |
| TOTAL | 1613.84 | 1226.39 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 2946.49 MBTU | 153.1 KBTU/SQFT-YR GROSS-AREA | 153.1 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 6391.86 MBTU | 332.2 KBTU/SQFT-YR GROSS-AREA | 332.2 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.0
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| | | | |
|---|---|---|---|
| Estimate: | BLDG 1242 ECO-4 | Date: | 22-Dec-94 |
| Description: | INSTALL NATURAL GAS BOILER | | |
| Project: | ECIP / FEMP | Bid Date: | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 |
| Sq. footage: | | City indx: | Raleigh, NC |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 1551153320 | HTG BR GAS CI STD HTWR GOP 2000 MBH | | | | | 1.00 Ea. | |
| Unit values | | 84.21 | 12487.50 | 1376.38 | 0.00 | 0.00 | 13863.88 |
| Totals | | 84.21 | $12,488 | $1,376 | $0 | $0 | $13,864 |
| U15 MECHANICAL | | 85 | $12,488 | $1,376 | $0 | $0 | $13,864 |

| Line # Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| ESTIMATE TOTAL | 85 | $12,488 | $1,376 | $0 | $0 | $13,864 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $303 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $12,488 | $1,679 | $0 | $0 | $14,167 |
| CONTINGENCY | 15.00% | | | | | $2,125 |
| BOND | 3.00% | | | | | $425 |
| PROFIT | 10.00% | | | | | $1,417 |
| JOB TOTAL | | | | | | $18,133 |

Estimate: BLDG 1242 ECO-4 Date: 22-Dec-94
Description: INSTALL NATURAL GAS BOILER
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U15 MECHANICAL | 85 | $12,488 | $1,376 | $0 | $0 | $13,864 |
| TOTAL | 85 | $12,488 | $1,376 | $0 | $0 | $13,864 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $303 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $12,488 | $1,679 | $0 | $0 | $14,167 |
| CONTINGENCY | 15.00% | | | | | $2,125 |
| BOND | 3.00% | | | | | $425 |
| PROFIT | 10.00% | | | | | $1,417 |
| JOB TOTAL | | | | | | $18,133 |

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: ECO4
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 ECO 4 REPLACE OIL HEAT WITH NATURAL GAS
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 1-1326
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 31659. | | |
| B. SIOH | $ 1256. | | |
| C. DESIGN COST | $ 1256. | | |
| D. TOTAL COST (1A+1B+1C) | $ 34171. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | $ 0. | | |
| F. PUBLIC UTILITY COMPANY REBATE | $ 0. | | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | $ | 34171. |

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

| FUEL | UNIT COST $/ MWH(1) | SAVINGS MWH/YR(2) | ANNUAL $ SAVINGS(3) | DISCOUNT FACTOR(4) | DISCOUNTED SAVINGS(5) |
|---|---|---|---|---|---|
| A. ELECT | $ 34.95 | 0. | $ 0. | 15.08 | $ 0. |
| B. DIST | $ 19.18 | 1490. | $ 28572. | 18.57 | $ 530590. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | -1375. | $ -18499. | 18.58 | $ -343709. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 114. | $ 10074. | | $ 186881. |

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

| | | | |
|---|---|---|---|
| A. ANNUAL RECURRING (+/-) | | | $ 500. |
| (1) DISCOUNT FACTOR (TABLE A) | | 14.88 | |
| (2) DISCOUNTED SAVING/COST (3A X 3A1) | | | $ 7440. |

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

| ITEM | SAVINGS(+) COST(-) (1) | YR OC (2) | DISCNT FACTR (3) | DISCOUNTED SAVINGS(+)/ COST(-)(4) |
|---|---|---|---|---|
| 1. FUEL OIL TANK | $ 10000. | 7 | .81 | 8100. |
| d. TOTAL | $ 10000. | | | 8100. |

| | | |
|---|---|---|
| C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4) | $ | 15540. |
| 4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) | $ | 11074. |
| 5. SIMPLE PAYBACK PERIOD (1G/4) | | 3.09 YEARS |
| 6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) | $ | 202421. |
| 7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= (IF < 1 PROJECT DOES NOT QUALIFY) | | 5.92 |
| 8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): | | 12.58 % |

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 285.53 | 5085.34 |
| SPACE COOL | 1748.59 | 0.00 |
| HVAC AUX | 1223.96 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1903.50 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 1087.17 | 0.00 |
| TOTAL | 6248.75 | 5085.34 |

TOTAL SITE ENERGY 11333.96 MBTU 192.0 KBTU/SQFT-YR GROSS-AREA 192.0 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 23849.96 MBTU 404.0 KBTU/SQFT-YR GROSS-AREA 404.0 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 36.3
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | NATURAL-GAS |
|---|---|---|
| SPACE HEAT | 285.53 | 4694.16 |
| SPACE COOL | 1748.59 | 0.00 |
| HVAC AUX | 1223.96 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1903.50 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 1087.17 | 0.00 |
| TOTAL | 6248.75 | 4694.16 |

TOTAL SITE ENERGY 10942.78 MBTU 185.4 KBTU/SQFT-YR GROSS-AREA 185.4 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 23458.78 MBTU 397.4 KBTU/SQFT-YR GROSS-AREA 397.4 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 36.3
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

Estimate: BLDG 1326 ECO-4 Date: 22-Dec-94
Description: INSTALL NATURAL GAS BOILER
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 1551153360 | HTG BR GAS CI STD HTWR GOP 2856 MBH | | | | | 1.00 Ea. | |
| | Unit values | 96.97 | 17682.30 | 1588.13 | 0.00 | 0.00 | 19270.43 |
| | Totals | 96.97 | $17,682 | $1,588 | $0 | $0 | $19,270 |
| U15 MECHANICAL | | 97 | $17,682 | $1,588 | $0 | $0 | $19,270 |

| Line # Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| ESTIMATE TOTAL | 97 | $17,682 | $1,588 | $0 | $0 | $19,270 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $349 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $17,682 | $1,937 | $0 | $0 | $19,619 |
| CONTINGENCY | 15.00% | | | | | $2,943 |
| BOND | 3.00% | | | | | $589 |
| PROFIT | 10.00% | | | | | $1,962 |
| JOB TOTAL | | | | | | $25,113 |

Estimate: BLDG 1326 ECO-4 Date: 22-Dec-94
Description: INSTALL NATURAL GAS BOILER
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U15 MECHANICAL | 97 | $17,682 | $1,588 | $0 | $0 | $19,270 |
| TOTAL | 97 | $17,682 | $1,588 | $0 | $0 | $19,270 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $349 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $17,682 | $1,937 | $0 | $0 | $19,619 |
| CONTINGENCY | 15.00% | | | | | $2,943 |
| BOND | 3.00% | | | | | $589 |
| PROFIT | 10.00% | | | | | $1,962 |
| JOB TOTAL | | | | | | $25,113 |

LIFE CYCLE COST ANALYSIS SUMMARY STUDY: ECO4
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 ECO 4 REPLACE OIL HEAT WITH NATURAL GAS
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 1-1333
ANALYSIS DATE: 03-16-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 17447. | | |
| B. SIOH | $ 545. | | |
| C. DESIGN COST | $ 545. | | |
| D. TOTAL COST (1A+1B+1C) | $ 18537. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 18537. |

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

| FUEL | UNIT COST $/ MWH(1) | SAVINGS MWH/YR(2) | ANNUAL $ SAVINGS(3) | DISCOUNT FACTOR(4) | DISCOUNTED SAVINGS(5) |
|---|---|---|---|---|---|
| A. ELECT | $ 34.95 | 0. | $ 0. | 15.08 | $ 0. |
| B. DIST | $ 19.18 | 261. | $ 5009. | 18.57 | $ 93025. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | -241. | $ -3243. | 18.58 | $ -60249. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 20. | $ 1767. | | $ 32777. |

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

| | | |
|---|---|---|
| A. ANNUAL RECURRING (+/-) | | $ 500. |
| (1) DISCOUNT FACTOR (TABLE A) | 14.88 | |
| (2) DISCOUNTED SAVING/COST (3A X 3A1) | | $ 7440. |

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

| ITEM | SAVINGS(+) COST(-) (1) | YR OC (2) | DISCNT FACTR (3) | DISCOUNTED SAVINGS(+)/ COST(-)(4) |
|---|---|---|---|---|
| 1. FUEL OIL TANK | $ 10000. | 7 | .81 | 8100. |
| d. TOTAL | $ 10000. | | | 8100. |

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4) $ 15540.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) $ 2767.

5. SIMPLE PAYBACK PERIOD (1G/4) 6.70 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) $ 48317.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 2.61
(IF < 1 PROJECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): 8.05 %

| ENERGY TYPE<br>IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 79.52 | 891.42 |
| SPACE COOL | 347.65 | 0.00 |
| HVAC AUX | 192.92 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 303.25 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 324.51 | 0.00 |
| TOTAL | 1247.85 | 891.42 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 2139.24 MBTU | 162.3 KBTU/SQFT-YR GROSS-AREA | 162.3 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 4638.62 MBTU | 351.9 KBTU/SQFT-YR GROSS-AREA | 351.9 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 4.5

PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | NATURAL-GAS |
|---|---|---|
| SPACE HEAT | 79.52 | 822.85 |
| SPACE COOL | 347.65 | 0.00 |
| HVAC AUX | 192.92 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 303.25 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 324.51 | 0.00 |
| TOTAL | 1247.85 | 822.85 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 2070.67 MBTU | 157.1 KBTU/SQFT-YR GROSS-AREA | 157.1 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 4570.05 MBTU | 346.7 KBTU/SQFT-YR GROSS-AREA | 346.7 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 4.5
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| | | | |
|---|---|---|---|
| Estimate: | BLDG 1333 ECO-4 | Date: | 22-Dec-94 |
| Description: | INSTALL NATURAL GAS BOILER | | |
| Project: | ECIP / FEMP | Bid Date: | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 |
| Sq. footage: | | City indx: | Raleigh, NC |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 1551153260 | GAS HOT WATER, CI BOILER, 1088 MBH | | | | | 1.00 Ea. | |
| | Unit values | 64.00 | 7242.75 | 1043.63 | 0.00 | 0.00 | 8286.38 |
| | Totals | 64.00 | $7,243 | $1,044 | $0 | $0 | $8,287 |
| U15 MECHANICAL | | 64 | $7,243 | $1,044 | $0 | $0 | $8,287 |

| Line # Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| ESTIMATE TOTAL | 64 | $7,243 | $1,044 | $0 | $0 | $8,287 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $230 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $7,243 | $1,274 | $0 | $0 | $8,517 |
| CONTINGENCY | 15.00% | | | | | $1,278 |
| BOND | 3.00% | | | | | $256 |
| PROFIT | 10.00% | | | | | $852 |
| JOB TOTAL | | | | | | $10,901 |

| | | | |
|---|---|---|---|
| Estimate: | BLDG 1333 ECO-4 | Date: | 22-Dec-94 |
| Description: | INSTALL NATURAL GAS BOILER | | |
| Project: | ECIP / FEMP | Bid Date: | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 |
| Sq. footage: | | City indx: | Raleigh, NC |

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U15 MECHANICAL | 64 | $7,243 | $1,044 | $0 | $0 | $8,287 |
| TOTAL | 64 | $7,243 | $1,044 | $0 | $0 | $8,287 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $230 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $7,243 | $1,274 | $0 | $0 | $8,517 |
| CONTINGENCY | 15.00% | | | | | $1,278 |
| BOND | 3.00% | | | | | $256 |
| PROFIT | 10.00% | | | | | $852 |
| JOB TOTAL | | | | | | $10,901 |

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: ECO4
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 ECO 4 REPLACE OIL HEAT WITH NATURAL GAS
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1120
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 31659. | | |
| B. SIOH | $ 1256. | | |
| C. DESIGN COST | $ 1256. | | |
| D. TOTAL COST (1A+1B+1C) | $ 34171. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 34171. |

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

| FUEL | UNIT COST $/ MWH(1) | SAVINGS MWH/YR(2) | ANNUAL $ SAVINGS(3) | DISCOUNT FACTOR(4) | DISCOUNTED SAVINGS(5) |
|---|---|---|---|---|---|
| A. ELECT | $ 34.95 | 0. | $ 0. | 15.08 | $ 0. |
| B. DIST | $ 19.18 | 1388. | $ 26615. | 18.57 | $ 494236. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | -1281. | $ -17228. | 18.58 | $ -320096. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 107. | $ 9387. | | $ 174140. |

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

| | | |
|---|---|---|
| A. ANNUAL RECURRING (+/-) | | $ 500. |
| (1) DISCOUNT FACTOR (TABLE A) | 14.88 | |
| (2) DISCOUNTED SAVING/COST (3A X 3A1) | | $ 7440. |

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

| ITEM | SAVINGS(+) COST(-) (1) | YR OC (2) | DISCNT FACTR (3) | DISCOUNTED SAVINGS(+)/ COST(-)(4) |
|---|---|---|---|---|
| 1. FUEL OIL TANK | $ 10000. | 7 | .81 | 8100. |
| d. TOTAL | $ 10000. | | | 8100. |

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4) $ 15540.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) $ 10387.

5. SIMPLE PAYBACK PERIOD (1G/4) 3.29 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) $ 189680.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 5.55
(IF < 1 PROJECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): 12.22 %

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 181.42 | 4735.99 |
| SPACE COOL | 984.55 | 0.00 |
| HVAC AUX | 337.24 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1706.99 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 675.53 | 0.00 |
| TOTAL | 3885.73 | 4735.99 |

TOTAL SITE ENERGY 8621.56 MBTU 116.2 KBTU/SQFT-YR GROSS-AREA 116.2 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 16404.38 MBTU 221.1 KBTU/SQFT-YR GROSS-AREA 221.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.8
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE<br>IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | NATURAL-GAS |
|---|---|---|
| SPACE HEAT | 181.42 | 4371.68 |
| SPACE COOL | 984.55 | 0.00 |
| HVAC AUX | 337.24 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1706.99 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 675.53 | 0.00 |
| TOTAL | 3885.73 | 4371.68 |

TOTAL SITE ENERGY 8257.25 MBTU 111.3 KBTU/SQFT-YR GROSS-AREA 111.3 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 16040.07 MBTU 216.2 KBTU/SQFT-YR GROSS-AREA 216.2 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.8
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| | | | |
|---|---|---|---|
| Estimate: | BLDG 1120 ECO-4 | Date: | 22-Dec-94 |
| Description: | INSTALL NATURAL GAS BOILER | | |
| Project: | ECIP / FEMP | Bid Date: | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 |
| Sq. footage: | | City indx: | Raleigh, NC |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 1551153360 | HTG BR GAS CI STD HTWR GOP 2856 MBH | | | | | 1.00 Ea. | |
| Unit values | | 96.97 | 17682.30 | 1588.13 | 0.00 | 0.00 | 19270.43 |
| Totals | | 96.97 | $17,682 | $1,588 | $0 | $0 | $19,270 |
| U15 MECHANICAL | | 97 | $17,682 | $1,588 | $0 | $0 | $19,270 |

| Line # | Description | | | | | |
|---|---|---|---|---|---|---|
| | Manhours | Matl | Labor | Equipment | Sub | Total |
| ESTIMATE TOTAL | 97 | $17,682 | $1,588 | $0 | $0 | $19,270 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $349 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $17,682 | $1,937 | $0 | $0 | $19,619 |
| CONTINGENCY | 15.00% | | | | | $2,943 |
| BOND | 3.00% | | | | | $589 |
| PROFIT | 10.00% | | | | | $1,962 |
| JOB TOTAL | | | | | | $25,113 |

| | | | | |
|---|---|---|---|---|
| Estimate: | BLDG 1120 ECO-4 | Date: | 22-Dec-94 | |
| Description: | INSTALL NATURAL GAS BOILER | | | |
| Project: | ECIP / FEMP | Bid Date: | | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 | |
| Sq. footage: | | City indx: | Raleigh, NC | |

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U15 MECHANICAL | 97 | $17,682 | $1,588 | $0 | $0 | $19,270 |
| TOTAL | 97 | $17,682 | $1,588 | $0 | $0 | $19,270 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $349 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $17,682 | $1,937 | $0 | $0 | $19,619 |
| CONTINGENCY | 15.00% | | | | | $2,943 |
| BOND | 3.00% | | | | | $589 |
| PROFIT | 10.00% | | | | | $1,962 |
| JOB TOTAL | | | | | | $25,113 |

LIFE CYCLE COST ANALYSIS SUMMARY STUDY: ECO4
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 ECO 4 REPLACE OIL HEAT WITH NATURAL GAS
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1127
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 33429. | | |
| B. SIOH | $ 1344. | | |
| C. DESIGN COST | $ 1344. | | |
| D. TOTAL COST (1A+1B+1C) | $ 36117. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 36117. |

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

| FUEL | UNIT COST $/ MWH(1) | SAVINGS MWH/YR(2) | ANNUAL $ SAVINGS(3) | DISCOUNT FACTOR(4) | DISCOUNTED SAVINGS(5) |
|---|---|---|---|---|---|
| A. ELECT | $ 34.95 | 0. | $ 0. | 15.08 | $ 0. |
| B. DIST | $ 19.18 | 1013. | $ 19428. | 18.57 | $ 360785. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | -935. | $ -12576. | 18.58 | $ -233665. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 78. | $ 6852. | | $ 127120. |

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

| | | |
|---|---|---|
| A. ANNUAL RECURRING (+/-) | | $ 500. |
| (1) DISCOUNT FACTOR (TABLE A) | 14.88 | |
| (2) DISCOUNTED SAVING/COST (3A X 3A1) | | $ 7440. |

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

| ITEM | SAVINGS(+) COST(-) (1) | YR OC (2) | DISCNT FACTR (3) | DISCOUNTED SAVINGS(+)/ COST(-)(4) |
|---|---|---|---|---|
| 1. FUEL OIL TANK | $ 10000. | 7 | .81 | 8100. |
| d. TOTAL | $ 10000. | | | 8100. |

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4) $ 15540.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) $ 7852.

5. SIMPLE PAYBACK PERIOD (1G/4) 4.60 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) $ 142660.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 3.95
(IF < 1 PROJECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): 10.32 %

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 178.99 | 3457.19 |
| SPACE COOL | 1433.37 | 0.00 |
| HVAC AUX | 1108.49 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1512.83 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 566.01 | 0.00 |
| TOTAL | 4799.69 | 3457.19 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 8256.87 MBTU | 142.9 KBTU/SQFT-YR GROSS-AREA | 142.9 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 17870.65 MBTU | 309.2 KBTU/SQFT-YR GROSS-AREA | 309.2 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 48.6
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 1.3

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | NATURAL-GAS |
|---|---|---|
| SPACE HEAT | 178.99 | 3191.26 |
| SPACE COOL | 1433.37 | 0.00 |
| HVAC AUX | 1108.49 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1512.83 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 566.01 | 0.00 |
| TOTAL | 4799.69 | 3191.26 |

TOTAL SITE ENERGY 7990.93 MBTU 138.3 KBTU/SQFT-YR GROSS-AREA 138.3 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 17604.71 MBTU 304.6 KBTU/SQFT-YR GROSS-AREA 304.6 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 48.6
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 1.3

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| | | | |
|---|---|---|---|
| Estimate: | BLDG 1127 ECO-4 | Date: | 22-Dec-94 |
| Description: | INSTALL NATURAL GAS BOILER | | |
| Project: | ECIP / FEMP | Bid Date: | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 |
| Sq. footage: | | City indx: | Raleigh, NC |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 1551153380 | HTG BR GAS CI STD HTWR GOP 3264 MBH | | | | | 1.00 Ea. | |
| | Unit values | 106.00 | 18881.10 | 1739.38 | 0.00 | 0.00 | 20620.48 |
| | Totals | 106.00 | $18,881 | $1,739 | $0 | $0 | $20,620 |
| U15 MECHANICAL | | 106 | $18,881 | $1,739 | $0 | $0 | $20,620 |

| Line # Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| ESTIMATE TOTAL | 106 | $18,881 | $1,739 | $0 | $0 | $20,620 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $383 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $18,881 | $2,122 | $0 | $0 | $21,003 |
| CONTINGENCY | 15.00% | | | | | $3,150 |
| BOND | 3.00% | | | | | $630 |
| PROFIT | 10.00% | | | | | $2,100 |
| JOB TOTAL | | | | | | $26,883 |

| | | | |
|---|---|---|---|
| Estimate: | BLDG 1127 ECO-4 | Date: | 22-Dec-94 |
| Description: | INSTALL NATURAL GAS BOILER | | |
| Project: | ECIP / FEMP | Bid Date: | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 |
| Sq. footage: | | City indx: | Raleigh, NC |

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U15 MECHANICAL | 106 | $18,881 | $1,739 | $0 | $0 | $20,620 |
| TOTAL | 106 | $18,881 | $1,739 | $0 | $0 | $20,620 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $383 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $18,881 | $2,122 | $0 | $0 | $21,003 |
| CONTINGENCY | 15.00% | | | | | $3,150 |
| BOND | 3.00% | | | | | $630 |
| PROFIT | 10.00% | | | | | $2,100 |
| JOB TOTAL | | | | | | $26,883 |

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: ECO4
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 ECO 4 REPLACE OIL HEAT WITH NATURAL GAS
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1133
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 31659. | | |
| B. SIOH | $ 1256. | | |
| C. DESIGN COST | $ 1256. | | |
| D. TOTAL COST (1A+1B+1C) | $ 34171. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 34171. |

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

| FUEL | UNIT COST $/ MWH(1) | SAVINGS MWH/YR(2) | ANNUAL $ SAVINGS(3) | DISCOUNT FACTOR(4) | DISCOUNTED SAVINGS(5) |
|---|---|---|---|---|---|
| A. ELECT | $ 34.95 | 0. | $ 0. | 15.08 | $ 0. |
| B. DIST | $ 19.18 | 416. | $ 7983. | 18.57 | $ 148235. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | -384. | $ -5167. | 18.58 | $ -96004. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 32. | $ 2815. | | $ 52231. |

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

| | | | |
|---|---|---|---|
| A. ANNUAL RECURRING (+/-) | | | $ 500. |
| (1) DISCOUNT FACTOR (TABLE A) | | 14.88 | |
| (2) DISCOUNTED SAVING/COST (3A X 3A1) | | | $ 7440. |

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

| ITEM | SAVINGS(+) COST(-) (1) | YR OC (2) | DISCNT FACTR (3) | DISCOUNTED SAVINGS(+)/ COST(-)(4) |
|---|---|---|---|---|
| 1. FUEL OIL TANK | $ 10000. | 7 | .81 | 8100. |
| d. TOTAL | $ 10000. | | | 8100. |

| | |
|---|---|
| C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4) | $ 15540. |
| 4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) | $ 3815. |
| 5. SIMPLE PAYBACK PERIOD (1G/4) | 8.96 YEARS |
| 6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) | $ 67771. |
| 7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= (IF < 1 PROJECT DOES NOT QUALIFY) | 1.98 |
| 8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): | 6.59 % |

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 425.53 | 1420.44 |
| SPACE COOL | 947.02 | 0.00 |
| HVAC AUX | 103.49 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1011.38 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 379.22 | 0.00 |
| TOTAL | 2866.64 | 1420.44 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 4286.99 MBTU | 115.9 KBTU/SQFT-YR GROSS-AREA | 115.9 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 10028.71 MBTU | 271.2 KBTU/SQFT-YR GROSS-AREA | 271.2 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.0
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | NATURAL-GAS |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 425.53 | 1311.18 |
| SPACE COOL | 947.02 | 0.00 |
| HVAC AUX | 103.49 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1011.38 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 379.22 | 0.00 |
| TOTAL | 2866.64 | 1311.18 |

TOTAL SITE ENERGY 4177.73 MBTU 113.0 KBTU/SQFT-YR GROSS-AREA 113.0 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 9919.44 MBTU 268.3 KBTU/SQFT-YR GROSS-AREA 268.3 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.0
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| | | | |
|---|---|---|---|
| Estimate: | BLDG 1133 ECO-4 | Date: | 22-Dec-94 |
| Description: | INSTALL NATURAL GAS BOILER | | |
| Project: | ECIP / FEMP | Bid Date: | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 |
| Sq. footage: | | City indx: | Raleigh, NC |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 1551153360 | HTG BR GAS CI STD HTWR GOP 2856 MBH | | | | | 1.00 Ea. | |
| Unit values | | 96.97 | 17682.30 | 1588.13 | 0.00 | 0.00 | 19270.43 |
| Totals | | 96.97 | $17,682 | $1,588 | $0 | $0 | $19,270 |
| U15 MECHANICAL | | 97 | $17,682 | $1,588 | $0 | $0 | $19,270 |

| Line # Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| ESTIMATE TOTAL | 97 | $17,682 | $1,588 | $0 | $0 | $19,270 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $349 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $17,682 | $1,937 | $0 | $0 | $19,619 |
| CONTINGENCY | 15.00% | | | | | $2,943 |
| BOND | 3.00% | | | | | $589 |
| PROFIT | 10.00% | | | | | $1,962 |
| JOB TOTAL | | | | | | $25,113 |

Estimate: BLDG 1133 ECO-4 Date: 22-Dec-94
Description: INSTALL NATURAL GAS BOILER
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U15 MECHANICAL | 97 | $17,682 | $1,588 | $0 | $0 | $19,270 |
| TOTAL | 97 | $17,682 | $1,588 | $0 | $0 | $19,270 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $349 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $17,682 | $1,937 | $0 | $0 | $19,619 |
| CONTINGENCY | 15.00% | | | | | $2,943 |
| BOND | 3.00% | | | | | $589 |
| PROFIT | 10.00% | | | | | $1,962 |
| JOB TOTAL | | | | | | $25,113 |

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: ECO4
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 ECO 4 REPLACE OIL HEAT WITH NATURAL GAS
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1138
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 27356. | | |
| B. SIOH | $ 1041. | | |
| C. DESIGN COST | $ 1041. | | |
| D. TOTAL COST (1A+1B+1C) | $ 29438. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 29438. |

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

| FUEL | UNIT COST $/ MWH(1) | SAVINGS MWH/YR(2) | ANNUAL $ SAVINGS(3) | DISCOUNT FACTOR(4) | DISCOUNTED SAVINGS(5) |
|---|---|---|---|---|---|
| A. ELECT | $ 34.95 | 0. | $ 0. | 15.08 | $ 0. |
| B. DIST | $ 19.18 | 1122. | $ 21514. | 18.57 | $ 399515. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | -1035. | $ -13926. | 18.58 | $ -258750. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 86. | $ 7588. | | $ 140765. |

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

| | | |
|---|---|---|
| A. ANNUAL RECURRING (+/-) | | $ 500. |
| (1) DISCOUNT FACTOR (TABLE A) | 14.88 | |
| (2) DISCOUNTED SAVING/COST (3A X 3A1) | | $ 7440. |

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

| ITEM | SAVINGS(+) COST(-) (1) | YR OC (2) | DISCNT FACTR (3) | DISCOUNTED SAVINGS(+)/ COST(-)(4) |
|---|---|---|---|---|
| 1. FUEL OIL TANK | $ 10000. | 7 | .81 | 8100. |
| d. TOTAL | $ 10000. | | | 8100. |

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4) $ 15540.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) $ 8588.

5. SIMPLE PAYBACK PERIOD (1G/4) 3.43 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) $ 156305.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 5.31
(IF < 1 PROJECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): 11.97 %

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 398.05 | 1053.81 |
| SPACE COOL | 344.03 | 0.00 |
| HVAC AUX | 373.27 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 466.41 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 325.45 | 0.00 |
| TOTAL | 1907.21 | 1053.81 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 2961.09 MBTU | 91.3 KBTU/SQFT-YR GROSS-AREA | 91.3 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 6781.38 MBTU | 209.1 KBTU/SQFT-YR GROSS-AREA | 209.1 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.1
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 40.62 | 873.22 |
| SPACE COOL | 489.12 | 0.00 |
| HVAC AUX | 399.71 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 664.40 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 669.36 | 0.00 |
| TOTAL | 2263.21 | 873.22 |

TOTAL SITE ENERGY 3136.42 MBTU 165.3 KBTU/SQFT-YR GROSS-AREA 165.3 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 7669.62 MBTU 404.1 KBTU/SQFT-YR GROSS-AREA 404.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 3.3
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 63.02 | 1901.29 |
| SPACE COOL | 324.06 | 0.00 |
| HVAC AUX | 453.90 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 664.37 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 669.34 | 0.00 |
| TOTAL | 2174.70 | 1901.29 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 4076.03 MBTU | 214.8 KBTU/SQFT-YR GROSS-AREA | 214.8 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 8432.04 MBTU | 444.3 KBTU/SQFT-YR GROSS-AREA | 444.3 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.6
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE<br>IN SITE MBTU - | ELECTRICITY | NATURAL-GAS |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 398.05 | 972.75 |
| SPACE COOL | 344.03 | 0.00 |
| HVAC AUX | 373.27 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 466.41 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 325.45 | 0.00 |
| TOTAL | 1907.21 | 972.75 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 2880.03 MBTU | 88.8 KBTU/SQFT-YR GROSS-AREA | 88.8 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 6700.31 MBTU | 206.6 KBTU/SQFT-YR GROSS-AREA | 206.6 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.1
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | NATURAL-GAS |
|---|---|---|
| SPACE HEAT | 40.62 | 806.05 |
| SPACE COOL | 489.12 | 0.00 |
| HVAC AUX | 399.71 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 664.40 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 669.36 | 0.00 |
| TOTAL | 2263.21 | 806.05 |

TOTAL SITE ENERGY 3069.25 MBTU 161.7 KBTU/SQFT-YR GROSS-AREA 161.7 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 7602.45 MBTU 400.6 KBTU/SQFT-YR GROSS-AREA 400.6 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 3.3
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | NATURAL-GAS |
|---|---|---|
| SPACE HEAT | 63.02 | 1755.04 |
| SPACE COOL | 324.06 | 0.00 |
| HVAC AUX | 453.90 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 664.37 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 669.34 | 0.00 |
| TOTAL | 2174.70 | 1755.04 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 3929.78 MBTU | 207.1 KBTU/SQFT-YR GROSS-AREA | 207.1 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 8285.79 MBTU | 436.6 KBTU/SQFT-YR GROSS-AREA | 436.6 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.6
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| | | | |
|---|---|---|---|
| Estimate: | BLDG 1138 ECO-4 | Date: | 22-Dec-94 |
| Description: | INSTALL NATURAL GAS BOILER | | |
| Project: | ECIP / FEMP | Bid Date: | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 |
| Sq. footage: | | City indx: | Raleigh, NC |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 1551153340 | HTG BR GAS CI STD HTWR GOP 2312 MBH | | | | | 1.00 Ea. | |
| | Unit values | 88.89 | 14485.50 | 1452.00 | 0.00 | 0.00 | 15937.50 |
| | Totals | 88.89 | $14,486 | $1,452 | $0 | $0 | $15,938 |
| U15 MECHANICAL | | 89 | $14,486 | $1,452 | $0 | $0 | $15,938 |

| Line # Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| ESTIMATE TOTAL | 89 | $14,486 | $1,452 | $0 | $0 | $15,938 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $319 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $14,486 | $1,771 | $0 | $0 | $16,257 |
| CONTINGENCY | 15.00% | | | | | $2,439 |
| BOND | 3.00% | | | | | $488 |
| PROFIT | 10.00% | | | | | $1,626 |
| JOB TOTAL | | | | | | $20,810 |

Estimate: BLDG 1138 ECO-4 Date: 22-Dec-94
Description: INSTALL NATURAL GAS BOILER
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U15 MECHANICAL | 89 | $14,486 | $1,452 | $0 | $0 | $15,938 |
| TOTAL | 89 | $14,486 | $1,452 | $0 | $0 | $15,938 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $319 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $14,486 | $1,771 | $0 | $0 | $16,257 |
| CONTINGENCY | 15.00% | | | | | $2,439 |
| BOND | 3.00% | | | | | $488 |
| PROFIT | 10.00% | | | | | $1,626 |
| JOB TOTAL | | | | | | $20,810 |

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: ECO4
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 ECO 4 REPLACE OIL HEAT WITH NATURAL GAS
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1549
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 86613. | | |
| B. SIOH | $ 4003. | | |
| C. DESIGN COST | $ 4003. | | |
| D. TOTAL COST (1A+1B+1C) | $ 94619. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 94619. |

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

| FUEL | UNIT COST $/ MWH(1) | SAVINGS MWH/YR(2) | ANNUAL $ SAVINGS(3) | DISCOUNT FACTOR(4) | DISCOUNTED SAVINGS(5) |
|---|---|---|---|---|---|
| A. ELECT | $ 34.95 | 16. | $ 545. | 15.08 | $ 8217. |
| B. DIST | $ 19.18 | 1115. | $ 21386. | 18.57 | $ 397136. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | -618. | $ -8319. | 18.58 | $ -154561. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 512. | $ 13612. | | $ 250791. |

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

A. ANNUAL RECURRING (+/-) $ 500.
(1) DISCOUNT FACTOR (TABLE A) 14.88
(2) DISCOUNTED SAVING/COST (3A X 3A1) $ 7440.

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

| ITEM | SAVINGS(+) COST(-) (1) | YR OC (2) | DISCNT FACTR (3) | DISCOUNTED SAVINGS(+)/ COST(-)(4) |
|---|---|---|---|---|
| 1. FUEL OIL TANK | $ 10000. | 7 | .81 | 8100. |
| d. TOTAL | $ 10000. | | | 8100. |

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4) $ 15540.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) $ 14612.

5. SIMPLE PAYBACK PERIOD (1G/4) 6.48 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) $ 266331.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 2.81
(IF < 1 PROJECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): 8.47 %

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 102.49 | 3805.53 |
| SPACE COOL | 0.00 | 0.00 |
| HVAC AUX | 52.17 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 661.50 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 94.60 | 0.00 |
| TOTAL | 910.77 | 3805.53 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 4716.32 MBTU | 205.1 KBTU/SQFT-YR GROSS-AREA | 205.1 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 6540.62 MBTU | 284.4 KBTU/SQFT-YR GROSS-AREA | 284.4 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 43.5
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE<br>IN SITE MBTU - | ELECTRICITY | NATURAL-GAS |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 63.39 | 2110.89 |
| SPACE COOL | 0.00 | 0.00 |
| HVAC AUX | 38.09 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 661.48 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 94.60 | 0.00 |
| TOTAL | 857.56 | 2110.89 |

TOTAL SITE ENERGY 2968.49 MBTU 129.1 KBTU/SQFT-YR GROSS-AREA 129.1 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 4686.25 MBTU 203.7 KBTU/SQFT-YR GROSS-AREA 203.7 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 0.0
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.7

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| | | | | | |
|---|---|---|---|---|---|
| Estimate: | BLDG 1549 ECO-4 | Date: | 03-Jan-95 | | |
| Description: | INFRARED HEATING | | | | |
| Project: | LIMITED EEAP(RDBRK | Bid Date: | | | |
| Location: | FORT BRAGG, N.C. | Job #: | 94013.05 | | |
| Sq. footage: | 30000 | City indx: | Raleigh, NC | | |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 0913100200 | 115V, 20 AMP INFRARED HTG SYS POWER WIRING INCL CONDUIT, WIRE, AND RECEPTACLES | | | | | 1000.00 L.F. | |
| | Unit values | 0.15 | 2.15 | 2.98 | 0.00 | 0.00 | 5.13 |
| | Totals | 149.00 | $2,148 | $2,978 | $0 | $0 | $5,126 |
| A09 ELECTRICAL | | 149 | $2,148 | $2,978 | $0 | $0 | $5,126 |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 0205541750 | PAVEMENT REMOVAL, BITUMINOUS, 4" TO 6" THICK | | | | | 6.00 S.Y. | |
| | Unit values | 0.10 | 0.00 | 1.73 | 2.50 | 0.00 | 4.23 |
| | Totals | 0.57 | $0 | $10 | $15 | $0 | $25 |
| 0205543200 | SITE REMOVAL,STEEL PIPE,WELDED CONNECTION, UP TO 4"DIAMETER | | | | | 1000.00 L.F. | |
| | Unit values | 0.15 | 0.00 | 2.61 | 1.06 | 0.00 | 3.68 |
| | Totals | 150.00 | $0 | $2,613 | $1,064 | $0 | $3,677 |
| 0208400600 | REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE | | | | | 100.00 L.F. | |
| | Unit values | 0.07 | 0.00 | 1.63 | 0.20 | 0.00 | 1.83 |
| | Totals | 7.10 | $0 | $163 | $20 | $0 | $183 |
| 0208401000 | REMOVE INSULATION FROM PIPE FITTING, UP TO 4" DIAMETER PIPE | | | | | 25.00 Ea. | |
| | Unit values | 0.20 | 0.00 | 4.60 | 0.56 | 0.00 | 5.16 |
| | Totals | 5.00 | $0 | $115 | $14 | $0 | $129 |
| 0222541900 | TAMPING TRENCH B'FILL, VIBRATING PLATE, ADD | | | | | 6.00 C.Y. | |
| | Unit values | 0.09 | 0.00 | 1.44 | 0.55 | 0.00 | 1.99 |
| | Totals | 0.53 | $0 | $9 | $3 | $0 | $12 |
| 0222582800 | TRENCH EXCVTNG 40HP CHNTRNCHR&BKFL 12"W24"D | | | | | 6.00 L.F. | |
| | Unit values | 0.01 | 0.00 | 0.20 | 0.20 | 0.00 | 0.39 |
| | Totals | 0.06 | $0 | $1 | $1 | $0 | $2 |
| 0251040380 | ASPHALTIC CONCRETE PAVEMENT, PAVING, WEARING COURSE, 2" THICK | | | | | 6.00 S.Y. | |
| | Unit values | 0.02 | 2.96 | 0.27 | 0.25 | 0.00 | 3.48 |
| | Totals | 0.09 | $18 | $2 | $1 | $0 | $21 |
| 0260120200 | BEDDING, FOR PIPE IN TRENCH SAND, DEAD OR BANK | | | | | 6.00 C.Y. | |
| | Unit values | 0.16 | 3.79 | 2.79 | 1.13 | 0.00 | 7.71 |
| | Totals | 0.96 | $23 | $17 | $7 | $0 | $47 |
| 0260120500 | BEDDING, PLACING IN TRENCH | | | | | 6.00 C.Y. | |
| | Unit values | 0.09 | 0.00 | 1.44 | 0.55 | 0.00 | 1.99 |
| | Totals | 0.53 | $0 | $9 | $3 | $0 | $12 |
| 0266907800 | CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | 1.00 | Ea. |
| Unit values | 1.56 | 404.00 | 29.36 | 4.89 | 0.00 | 438.25 |
| Totals | 1.56 | $404 | $29 | $5 | $0 | $438 |
| 0268520150 | GAS SERVICE & DISTRIB PIPING,POLYETHYLENE,60-PSI 1-1/4"DIAM SDR 10,COIL | | | | 55.00 | L.F. |
| Unit values | 0.06 | 0.63 | 1.10 | 0.00 | 0.00 | 1.72 |
| Totals | 3.30 | $34 | $60 | $0 | $0 | $94 |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| U02 SITEWORK | | 170 | $479 | $3,028 | $1,133 | $0 | $4,640 |
| 1517010650 | BLACK STEEL PIPE, SCHEDULE 40, THREADED, 4" DIAM W/CPLGS & HNGRS 10'OC | | | | | 800.00 L.F. | |
| Unit values | | 0.44 | 13.49 | 6.84 | 0.00 | 0.00 | 20.32 |
| Totals | | 355.20 | $10,789 | $5,469 | $0 | $0 | $16,258 |
| 1517011320 | PIPE STEEL GALV SCH 40 THRD W/CPLG & HNGR SZD FOR CVRG 10'OC 3/4" DIAM | | | | | 1300.00 L.F. | |
| Unit values | | 0.13 | 1.90 | 2.24 | 0.00 | 0.00 | 4.14 |
| Totals | | 170.30 | $2,468 | $2,918 | $0 | $0 | $5,386 |
| 1519010320 | ALUMINUM REFLECTORS WITH HANGERS | | | | | 85.00 Ea. | |
| Unit values | | 0.05 | 39.75 | 2.87 | 0.00 | 0.00 | 42.62 |
| Totals | | 4.25 | $3,379 | $244 | $0 | $0 | $3,623 |
| 1524105040 | INFRARED HTG SYS VACUUM PUMP AND VENT PIPING | | | | | 4.00 Ea. | |
| Unit values | | 3.00 | 737.61 | 90.75 | 0.00 | 0.00 | 828.36 |
| Totals | | 12.00 | $2,950 | $363 | $0 | $0 | $3,313 |
| 1552301020 | INFRARED HTG SYS GAS FIRED BURNER, 100 MBH, AND COMBUSTION CHAMBER | | | | | 24.00 Ea. | |
| Unit values | | 1.00 | 859.14 | 33.28 | 0.00 | 0.00 | 892.42 |
| Totals | | 24.00 | $20,619 | $799 | $0 | $0 | $21,418 |
| 1562600135 | GAS APPLIANCE REGULATORS DOUBLE DIAPHRAGM TYPE 3/4" PIPE SIZE FOR ROOFTP HVAC UN | | | | | 2.00 Ea. | |
| Unit values | | 0.40 | 54.95 | 6.84 | 0.00 | 0.00 | 61.78 |
| Totals | | 0.80 | $110 | $14 | $0 | $0 | $124 |
| 1562600137 | GAS APPLIANCE REGULATORS DOUBLE DIAPHRAGM TYPE 1-1/4" PIPE SIZE , FOR BLDG GAS S | | | | | 1.00 Ea. | |
| Unit values | | 0.53 | 225.77 | 9.14 | 0.00 | 0.00 | 234.91 |
| Totals | | 0.53 | $226 | $9 | $0 | $0 | $235 |
| U15 MECHANICAL | | 568 | $40,541 | $9,816 | $0 | $0 | $50,357 |

| Line # | Description | | | | | |
|---|---|---|---|---|---|---|
| | Manhours | Matl | Labor | Equipment | Sub | Total |
| 1631200100 | INFRARED HEATING SYS POWER / CONTROL PANEL | | | | 4.00 Ea. | |
| Unit values | 2.96 | 320.72 | 45.97 | 0.00 | 0.00 | 366.69 |
| Totals | 11.85 | $1,283 | $184 | $0 | $0 | $1,467 |
| U16 ELECTRICAL | 12 | $1,283 | $184 | $0 | $0 | $1,467 |

| Line # Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| ESTIMATE TOTAL | 899 | $44,451 | $16,006 | $1,133 | $0 | $61,590 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 0.00% | | $0 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 0.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $44,451 | $16,006 | $1,133 | $0 | $61,590 |
| CONTINGENCY | 20.00% | | | | | $12,318 |
| BOND | 0.00% | | | | | $0 |
| PROFIT | 10.00% | | | | | $6,159 |
| JOB TOTAL | | | | | | $80,067 |

Estimate: BLDG 1549 ECO-4 Date: 03-Jan-95
Description: INFRARED HEATING
Project: LIMITED EEAP(RDBRKBid Date:
Location: FORT BRAGG, N.C. Job #: 94013.05
Sq. footage: 30000 City indx:Raleigh, NC

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| A09 ELECTRICAL | 149 | $2,148 | $2,978 | $0 | $0 | $5,126 |
| U02 SITEWORK | 170 | $479 | $3,028 | $1,133 | $0 | $4,640 |
| U15 MECHANICAL | 568 | $40,541 | $9,816 | $0 | $0 | $50,357 |
| U16 ELECTRICAL | 12 | $1,283 | $184 | $0 | $0 | $1,467 |
| TOTAL | 899 | $44,451 | $16,006 | $1,133 | $0 | $61,590 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 0.00% | | $0 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 0.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $44,451 | $16,006 | $1,133 | $0 | $61,590 |
| CONTINGENCY | 20.00% | | | | | $12,318 |
| BOND | 0.00% | | | | | $0 |
| PROFIT | 10.00% | | | | | $6,159 |
| JOB TOTAL | | | | | | $80,067 |

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: ECO4
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 ECO 4 REPLACE OIL HEAT WITH NATURAL GAS
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1728
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 31659. | | |
| B. SIOH | $ 1256. | | |
| C. DESIGN COST | $ 1256. | | |
| D. TOTAL COST (1A+1B+1C) | $ 34171. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 34171. |

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

| FUEL | UNIT COST $/ MWH(1) | SAVINGS MWH/YR(2) | ANNUAL $ SAVINGS(3) | DISCOUNT FACTOR(4) | DISCOUNTED SAVINGS(5) |
|---|---|---|---|---|---|
| A. ELECT | $ 34.95 | 0. | $ 0. | 15.08 | $ 0. |
| B. DIST | $ 19.18 | 889. | $ 17060. | 18.57 | $ 316801. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | -821. | $ -11043. | 18.58 | $ -205179. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 68. | $ 6017. | | $ 111623. |

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

A. ANNUAL RECURRING (+/-) — $ 500.
(1) DISCOUNT FACTOR (TABLE A) — 14.88
(2) DISCOUNTED SAVING/COST (3A X 3A1) — $ 7440.

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

| ITEM | SAVINGS(+) COST(-) (1) | YR OC (2) | DISCNT FACTR (3) | DISCOUNTED SAVINGS(+)/ COST(-)(4) |
|---|---|---|---|---|
| 1. FUEL OIL TANK | $ 10000. | 7 | .81 | 8100. |
| d. TOTAL | $ 10000. | | | 8100. |

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4) $ 15540.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) $ 7017.

5. SIMPLE PAYBACK PERIOD (1G/4) — 4.87 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) — $ 127163.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= — 3.72
(IF < 1 PROJECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): — 9.99 %

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 133.98 | 3035.71 |
| SPACE COOL | 1096.12 | 0.00 |
| HVAC AUX | 1466.37 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1672.31 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 994.36 | 0.00 |
| TOTAL | 5363.14 | 3035.71 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 8398.77 MBTU | 112.3 KBTU/SQFT-YR GROSS-AREA | 112.3 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 19140.97 MBTU | 255.8 KBTU/SQFT-YR GROSS-AREA | 255.8 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 2.4
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE<br>IN SITE MBTU - | ELECTRICITY | NATURAL-GAS |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 133.98 | 2802.20 |
| SPACE COOL | 1096.12 | 0.00 |
| HVAC AUX | 1466.37 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1672.31 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 994.36 | 0.00 |
| TOTAL | 5363.14 | 2802.20 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 8165.25 MBTU | 109.1 KBTU/SQFT-YR GROSS-AREA | 109.1 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 18907.46 MBTU | 252.7 KBTU/SQFT-YR GROSS-AREA | 252.7 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 2.4
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| | | | |
|---|---|---|---|
| Estimate: | BLDG 1728 ECO-4 | Date: | 22-Dec-94 |
| Description: | INSTALL NATURAL GAS BOILER | | |
| Project: | ECIP / FEMP | Bid Date: | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 |
| Sq. footage: | | City indx: | Raleigh, NC |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 1551153360 | HTG BR GAS CI STD HTWR GOP 2856 MBH | | | | | 1.00 Ea. | |
| Unit values | | 96.97 | 17682.30 | 1588.13 | 0.00 | 0.00 | 19270.43 |
| Totals | | 96.97 | $17,682 | $1,588 | $0 | $0 | $19,270 |
| U15 MECHANICAL | | 97 | $17,682 | $1,588 | $0 | $0 | $19,270 |

| Line # Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| ESTIMATE TOTAL | 97 | $17,682 | $1,588 | $0 | $0 | $19,270 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $349 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $17,682 | $1,937 | $0 | $0 | $19,619 |
| CONTINGENCY | 15.00% | | | | | $2,943 |
| BOND | 3.00% | | | | | $589 |
| PROFIT | 10.00% | | | | | $1,962 |
| JOB TOTAL | | | | | | $25,113 |

| | | | |
|---|---|---|---|
| Estimate: | BLDG 1728 ECO-4 | Date: | 22-Dec-94 |
| Description: | INSTALL NATURAL GAS BOILER | | |
| Project: | ECIP / FEMP | Bid Date: | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 |
| Sq. footage: | | City indx: | Raleigh, NC |

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U15 MECHANICAL | 97 | $17,682 | $1,588 | $0 | $0 | $19,270 |
| TOTAL | 97 | $17,682 | $1,588 | $0 | $0 | $19,270 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $349 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $17,682 | $1,937 | $0 | $0 | $19,619 |
| CONTINGENCY | 15.00% | | | | | $2,943 |
| BOND | 3.00% | | | | | $589 |
| PROFIT | 10.00% | | | | | $1,962 |
| JOB TOTAL | | | | | | $25,113 |

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: ECO4
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 ECO 4 REPLACE OIL HEAT WITH NATURAL GAS
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1731
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 31659. | | |
| B. SIOH | $ 1256. | | |
| C. DESIGN COST | $ 1256. | | |
| D. TOTAL COST (1A+1B+1C) | $ 34171. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 34171. |

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

| FUEL | UNIT COST $/ MWH(1) | SAVINGS MWH/YR(2) | ANNUAL $ SAVINGS(3) | DISCOUNT FACTOR(4) | DISCOUNTED SAVINGS(5) |
|---|---|---|---|---|---|
| A. ELECT | $ 34.95 | -3. | $ -94. | 15.08 | $ -1423. |
| B. DIST | $ 19.18 | 582. | $ 11167. | 18.57 | $ 207364. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | -526. | $ -7073. | 18.58 | $ -131410. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 54. | $ 4000. | | $ 74530. |

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

A. ANNUAL RECURRING (+/-) — $ 500.
(1) DISCOUNT FACTOR (TABLE A) — 14.88
(2) DISCOUNTED SAVING/COST (3A X 3A1) — $ 7440.

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

| ITEM | SAVINGS(+) COST(-) (1) | YR OC (2) | DISCNT FACTR (3) | DISCOUNTED SAVINGS(+)/ COST(-) (4) |
|---|---|---|---|---|
| 1. FUEL OIL | $ 10000. | 7 | .81 | 8100. |
| d. TOTAL | $ 10000. | | | 8100. |

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4) $ 15540.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) $ 5000.

5. SIMPLE PAYBACK PERIOD (1G/4) — 6.83 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) — $ 90070.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= — 2.64
(IF < 1 PROJECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): — 8.11 %

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 40.00 | 764.80 |
| SPACE COOL | 597.47 | 0.00 |
| HVAC AUX | 159.66 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 737.12 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 430.90 | 0.00 |
| TOTAL | 1965.15 | 764.80 |

TOTAL SITE ENERGY 2729.95 MBTU 123.9 KBTU/SQFT-YR GROSS-AREA 123.9 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 6666.15 MBTU 302.5 KBTU/SQFT-YR GROSS-AREA 302.5 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 9.7
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 31.12 | 601.04 |
| SPACE COOL | 598.57 | 0.00 |
| HVAC AUX | 399.31 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 569.71 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 312.40 | 0.00 |
| TOTAL | 1911.12 | 601.04 |

TOTAL SITE ENERGY 2512.19 MBTU 109.8 KBTU/SQFT-YR GROSS-AREA 109.8 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 6340.23 MBTU 277.0 KBTU/SQFT-YR GROSS-AREA 277.0 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.4
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE<br>IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 32.17 | 621.20 |
| SPACE COOL | 601.67 | 0.00 |
| HVAC AUX | 402.21 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 569.72 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 306.02 | 0.00 |
| TOTAL | 1911.79 | 621.20 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 2532.99 MBTU | 110.7 KBTU/SQFT-YR GROSS-AREA | 110.7 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 6362.32 MBTU | 278.0 KBTU/SQFT-YR GROSS-AREA | 278.0 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.3
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | NATURAL-GAS |
|---|---|---|
| SPACE HEAT | 40.00 | 705.97 |
| SPACE COOL | 597.47 | 0.00 |
| HVAC AUX | 159.66 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 737.12 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 430.90 | 0.00 |
| TOTAL | 1965.15 | 705.97 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 2671.12 MBTU | 121.2 KBTU/SQFT-YR GROSS-AREA | 121.2 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 6607.32 MBTU | 299.8 KBTU/SQFT-YR GROSS-AREA | 299.8 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 9.7
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | NATURAL-GAS |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 31.12 | 554.80 |
| SPACE COOL | 598.57 | 0.00 |
| HVAC AUX | 399.31 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 569.71 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 312.40 | 0.00 |
| TOTAL | 1911.12 | 554.80 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 2465.95 MBTU | 107.7 KBTU/SQFT-YR GROSS-AREA | 107.7 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 6294.00 MBTU | 275.0 KBTU/SQFT-YR GROSS-AREA | 275.0 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.4
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE<br>IN SITE MBTU - | ELECTRICITY | NATURAL-GAS |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 29.95 | 533.97 |
| SPACE COOL | 601.67 | 0.00 |
| HVAC AUX | 413.62 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 569.72 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 306.02 | 0.00 |
| TOTAL | 1920.99 | 533.97 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 2454.97 MBTU | 107.3 KBTU/SQFT-YR GROSS-AREA | 107.3 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 6302.72 MBTU | 275.4 KBTU/SQFT-YR GROSS-AREA | 275.4 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.3
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| | | | |
|---|---|---|---|
| Estimate: | BLDG 1731 ECO-4 | Date: | 22-Dec-94 |
| Description: | INSTALL NATURAL GAS BOILER | | |
| Project: | ECIP / FEMP | Bid Date: | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 |
| Sq. footage: | | City indx: | Raleigh, NC |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 1551153360 | HTG BR GAS CI STD HTWR GOP 2856 MBH | | | | | 1.00 Ea. | |
| Unit values | | 96.97 | 17682.30 | 1588.13 | 0.00 | 0.00 | 19270.43 |
| Totals | | 96.97 | $17,682 | $1,588 | $0 | $0 | $19,270 |
| U15 MECHANICAL | | 97 | $17,682 | $1,588 | $0 | $0 | $19,270 |

| Line # Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| ESTIMATE TOTAL | 97 | $17,682 | $1,588 | $0 | $0 | $19,270 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $349 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $17,682 | $1,937 | $0 | $0 | $19,619 |
| CONTINGENCY | 15.00% | | | | | $2,943 |
| BOND | 3.00% | | | | | $589 |
| PROFIT | 10.00% | | | | | $1,962 |
| JOB TOTAL | | | | | | $25,113 |

| | | | | |
|---|---|---|---|---|
| Estimate: | BLDG 1731 ECO-4 | Date: | 22-Dec-94 | |
| Description: | INSTALL NATURAL GAS BOILER | | | |
| Project: | ECIP / FEMP | Bid Date: | | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 | |
| Sq. footage: | | City indx: | Raleigh, NC | |

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U15 MECHANICAL | 97 | $17,682 | $1,588 | $0 | $0 | $19,270 |
| TOTAL | 97 | $17,682 | $1,588 | $0 | $0 | $19,270 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $349 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $17,682 | $1,937 | $0 | $0 | $19,619 |
| CONTINGENCY | 15.00% | | | | | $2,943 |
| BOND | 3.00% | | | | | $589 |
| PROFIT | 10.00% | | | | | $1,962 |
| JOB TOTAL | | | | | | $25,113 |

This section contains the life-cycle cost analyses, energy calculations, and cost estimates for ECO-5: Install New Oil Heating Systems.

A single life-cycle cost analysis and cost estimate was performed for each building.

# TABLE OF CONTENTS

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: ECO5
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 INSTALL NEW FUEL OIL BOILERS
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 1-1242
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 30251. | | |
| B. SIOH | $ 1513. | | |
| C. DESIGN COST | $ 1513. | | |
| D. TOTAL COST (1A+1B+1C) | $ 33277. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 33277. |

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

| FUEL | UNIT COST $/ MWH(1) | SAVINGS MWH/YR(2) | ANNUAL $ SAVINGS(3) | DISCOUNT FACTOR(4) | DISCOUNTED SAVINGS(5) |
|---|---|---|---|---|---|
| A. ELECT | $ 34.95 | 0. | $ 0. | 15.08 | $ 0. |
| B. DIST | $ 19.18 | 30. | $ 574. | 18.57 | $ 10664. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | 0. | $ 0. | 18.58 | $ 0. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 30. | $ 574. | | $ 10664. |

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

| | | |
|---|---|---|
| A. ANNUAL RECURRING (+/-) | | $ 500. |
| (1) DISCOUNT FACTOR (TABLE A) | 14.88 | |
| (2) DISCOUNTED SAVING/COST (3A X 3A1) | | $ 7440. |

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) | $ 7440. |
| 4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) | $ 1074. |
| 5. SIMPLE PAYBACK PERIOD (1G/4) | 30.98 YEARS |
| 6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) | $ 18104. |
| 7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= | .54 |

(IF < 1 PROJECT DOES NOT QUALIFY)
**** Project does not qualify for ECIP funding; 4,5,6 for information only.

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): N/A

| ENERGY TYPE<br>IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 68.66 | 1328.59 |
| SPACE COOL | 310.70 | 0.00 |
| HVAC AUX | 369.70 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 622.17 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 242.60 | 0.00 |
| TOTAL | 1613.84 | 1328.59 |

TOTAL SITE ENERGY 3048.69 MBTU 158.5 KBTU/SQFT-YR GROSS-AREA 158.5 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 6494.06 MBTU 337.5 KBTU/SQFT-YR GROSS-AREA 337.5 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.0
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 68.66 | 1226.39 |
| SPACE COOL | 310.70 | 0.00 |
| HVAC AUX | 369.70 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 622.17 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 242.60 | 0.00 |
| TOTAL | 1613.84 | 1226.39 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 2946.49 MBTU | 153.1 KBTU/SQFT-YR GROSS-AREA | 153.1 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 6391.86 MBTU | 332.2 KBTU/SQFT-YR GROSS-AREA | 332.2 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.0
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| | | | |
|---|---|---|---|
| Estimate: | BLDG 1242 ECO-5 | Date: | 22-Dec-94 |
| Description: | INSTALL OIL BOILER | | |
| Project: | ECIP / FEMP | Bid Date: | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 |
| Sq. footage: | | City indx: | Raleigh, NC |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 1551207280 | HTG BLR OIL STL JCK&BRN HTW 2310MBH | | | | | 1.00 Ea. | |
| Unit values | | 100.00 | 21678.30 | 1603.25 | 0.00 | 0.00 | 23281.55 |
| Totals | | 100.00 | $21,678 | $1,603 | $0 | $0 | $23,281 |
| U15 MECHANICAL | | 100 | $21,678 | $1,603 | $0 | $0 | $23,281 |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| ESTIMATE TOTAL | | 100 | $21,678 | $1,603 | $0 | $0 | $23,281 |
| SALES TAX | | 0.00% | $0 | | | | |
| MATL MARKUP | | 0.00% | $0 | | | | |
| LABOR MARKUP | | 22.00% | | $353 | | | |
| EQUIPT MARKUP | | 0.00% | | | $0 | | |
| SUB MARKUP | | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | | $21,678 | $1,956 | $0 | $0 | $23,634 |
| CONTINGENCY | | 15.00% | | | | | $3,545 |
| BOND | | 3.00% | | | | | $709 |
| PROFIT | | 10.00% | | | | | $2,363 |
| JOB TOTAL | | | | | | | $30,251 |

Estimate: BLDG 1242 ECO-5 Date: 22-Dec-94
Description: INSTALL OIL BOILER
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U15 MECHANICAL | 100 | $21,678 | $1,603 | $0 | $0 | $23,281 |
| TOTAL | 100 | $21,678 | $1,603 | $0 | $0 | $23,281 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $353 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $21,678 | $1,956 | $0 | $0 | $23,634 |
| CONTINGENCY | 15.00% | | | | | $3,545 |
| BOND | 3.00% | | | | | $709 |
| PROFIT | 10.00% | | | | | $2,363 |
| JOB TOTAL | | | | | | $30,251 |

LIFE CYCLE COST ANALYSIS SUMMARY STUDY: ECO5
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 INSTALL NEW FUEL OIL BOILERS
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 1-1326
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 38045. | | |
| B. SIOH | $ 1902. | | |
| C. DESIGN COST | $ 1902. | | |
| D. TOTAL COST (1A+1B+1C) | $ 41849. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 41849. |

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

| FUEL | UNIT COST $/ MWH(1) | SAVINGS MWH/YR(2) | ANNUAL $ SAVINGS(3) | DISCOUNT FACTOR(4) | DISCOUNTED SAVINGS(5) |
|---|---|---|---|---|---|
| A. ELECT | $ 34.95 | 0. | $ 0. | 15.08 | $ 0. |
| B. DIST | $ 19.18 | 114. | $ 2193. | 18.57 | $ 40718. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | 0. | $ 0. | 18.58 | $ 0. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 114. | $ 2193. | | $ 40718. |

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

| | | |
|---|---|---|
| A. ANNUAL RECURRING (+/-) | | $ 500. |
| (1) DISCOUNT FACTOR (TABLE A) | 14.88 | |
| (2) DISCOUNTED SAVING/COST (3A X 3A1) | | $ 7440. |

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) | $ 7440. |
| 4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) | $ 2693. |
| 5. SIMPLE PAYBACK PERIOD (1G/4) | 15.54 YEARS |
| 6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) | $ 48158. |
| 7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= (IF < 1 PROJECT DOES NOT QUALIFY) | 1.15 |
| 8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): | 3.73 % |

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 285.53 | 5085.34 |
| SPACE COOL | 1748.59 | 0.00 |
| HVAC AUX | 1223.96 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1903.50 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 1087.17 | 0.00 |
| TOTAL | 6248.75 | 5085.34 |

TOTAL SITE ENERGY 11333.96 MBTU 192.0 KBTU/SQFT-YR GROSS-AREA 192.0 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 23849.96 MBTU 404.0 KBTU/SQFT-YR GROSS-AREA 404.0 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 36.3
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 285.53 | 4694.16 |
| SPACE COOL | 1748.59 | 0.00 |
| HVAC AUX | 1223.96 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1903.50 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 1087.17 | 0.00 |
| TOTAL | 6248.75 | 4694.16 |

TOTAL SITE ENERGY 10942.78 MBTU 185.4 KBTU/SQFT-YR GROSS-AREA 185.4 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 23458.78 MBTU 397.4 KBTU/SQFT-YR GROSS-AREA 397.4 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 36.3
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| | | | |
|---|---|---|---|
| Estimate: | BLDG 1326 ECO-5 | Date: | 22-Dec-94 |
| Description: | INSTALL OIL BOILER | | |
| Project: | ECIP / FEMP | Bid Date: | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 |
| Sq. footage: | | City indx: | Raleigh, NC |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 1551207300 | HTG BLR OIL STL JCK&BRN HTW 2835MBH | | | | | 1.00 Ea. | |
| | Unit values | 141.00 | 26973.00 | 2253.63 | 0.00 | 0.00 | 29226.63 |
| | Totals | 141.00 | $26,973 | $2,254 | $0 | $0 | $29,227 |
| U15 MECHANICAL | | 141 | $26,973 | $2,254 | $0 | $0 | $29,227 |

| Line # Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| ESTIMATE TOTAL | 141 | $26,973 | $2,254 | $0 | $0 | $29,227 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $496 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $26,973 | $2,750 | $0 | $0 | $29,723 |
| CONTINGENCY | 15.00% | | | | | $4,458 |
| BOND | 3.00% | | | | | $892 |
| PROFIT | 10.00% | | | | | $2,972 |
| JOB TOTAL | | | | | | $38,045 |

Estimate: BLDG 1326 ECO-5 Date: 22-Dec-94
Description: INSTALL OIL BOILER
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U15 MECHANICAL | 141 | $26,973 | $2,254 | $0 | $0 | $29,227 |
| TOTAL | 141 | $26,973 | $2,254 | $0 | $0 | $29,227 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $496 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $26,973 | $2,750 | $0 | $0 | $29,723 |
| CONTINGENCY | 15.00% | | | | | $4,458 |
| BOND | 3.00% | | | | | $892 |
| PROFIT | 10.00% | | | | | $2,972 |
| JOB TOTAL | | | | | | $38,045 |

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: ECO5
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 INSTALL NEW FUEL OIL BOILERS
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 1-1333
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 15740. | | |
| B. SIOH | $ 787. | | |
| C. DESIGN COST | $ 787. | | |
| D. TOTAL COST (1A+1B+1C) | $ 17314. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | $ 0. | | |
| F. PUBLIC UTILITY COMPANY REBATE | $ 0. | | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | $ | 17314. |

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

| FUEL | UNIT COST $/ MWH(1) | SAVINGS MWH/YR(2) | ANNUAL $ SAVINGS(3) | DISCOUNT FACTOR(4) | DISCOUNTED SAVINGS(5) |
|---|---|---|---|---|---|
| A. ELECT | $ 34.95 | 0. | $ 0. | 15.08 | $ 0. |
| B. DIST | $ 19.18 | 20. | $ 385. | 18.57 | $ 7156. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | 0. | $ 0. | 18.58 | $ 0. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 20. | $ 385. | | $ 7156. |

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

| | | |
|---|---|---|
| A. ANNUAL RECURRING (+/-) | | $ 500. |
| (1) DISCOUNT FACTOR (TABLE A) | 14.88 | |
| (2) DISCOUNTED SAVING/COST (3A X 3A1) | | $ 7440. |

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) | $ | 7440. |
| 4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) | $ | 885. |
| 5. SIMPLE PAYBACK PERIOD (1G/4) | | 19.56 YEARS |
| 6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) | $ | 14596. |
| 7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= | | .84 |

(IF < 1 PROJECT DOES NOT QUALIFY)
**** Project does not qualify for ECIP funding; 4,5,6 for information only.

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): N/A

| ENERGY TYPE<br>IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 79.52 | 891.42 |
| SPACE COOL | 347.65 | 0.00 |
| HVAC AUX | 192.92 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 303.25 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 324.51 | 0.00 |
| TOTAL | 1247.85 | 891.42 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 2139.24 MBTU | 162.3 KBTU/SQFT-YR GROSS-AREA | 162.3 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 4638.62 MBTU | 351.9 KBTU/SQFT-YR GROSS-AREA | 351.9 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 4.5

PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 79.52 | 822.85 |
| SPACE COOL | 347.65 | 0.00 |
| HVAC AUX | 192.92 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 303.25 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 324.51 | 0.00 |
| TOTAL | 1247.85 | 822.85 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 2070.67 MBTU | 157.1 KBTU/SQFT-YR GROSS-AREA | 157.1 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 4570.05 MBTU | 346.7 KBTU/SQFT-YR GROSS-AREA | 346.7 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 4.5
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| | | | |
|---|---|---|---|
| Estimate: | BLDG 1333 ECO-5 | Date: | 22-Dec-94 |
| Description: | INSTALL OIL BOILER | | |
| Project: | ECIP / FEMP | Bid Date: | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 |
| Sq. footage: | | City indx: | Raleigh, NC |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 1551207220 | HTG BLR OIL STL JCK&BRN HTW 1050MBH | | | | | 1.00 Ea. | |
| | Unit values | 57.14 | 11188.80 | 907.50 | 0.00 | 0.00 | 12096.30 |
| | Totals | 57.14 | $11,189 | $908 | $0 | $0 | $12,097 |
| U15 MECHANICAL | | 58 | $11,189 | $908 | $0 | $0 | $12,097 |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| ESTIMATE TOTAL | | 58 | $11,189 | $908 | $0 | $0 | $12,097 |
| SALES TAX | | 0.00% | $0 | | | | |
| MATL MARKUP | | 0.00% | $0 | | | | |
| LABOR MARKUP | | 22.00% | | $200 | | | |
| EQUIPT MARKUP | | 0.00% | | | $0 | | |
| SUB MARKUP | | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | | $11,189 | $1,108 | $0 | $0 | $12,297 |
| CONTINGENCY | | 15.00% | | | | | $1,845 |
| BOND | | 3.00% | | | | | $369 |
| PROFIT | | 10.00% | | | | | $1,230 |
| JOB TOTAL | | | | | | | $15,740 |

Estimate: BLDG 1333 ECO-5 Date: 22-Dec-94
Description: INSTALL OIL BOILER
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U15 MECHANICAL | 58 | $11,189 | $908 | $0 | $0 | $12,097 |
| TOTAL | 58 | $11,189 | $908 | $0 | $0 | $12,097 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $200 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $11,189 | $1,108 | $0 | $0 | $12,297 |
| CONTINGENCY | 15.00% | | | | | $1,845 |
| BOND | 3.00% | | | | | $369 |
| PROFIT | 10.00% | | | | | $1,230 |
| JOB TOTAL | | | | | | $15,740 |

LIFE CYCLE COST ANALYSIS SUMM

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID FY95 (92)

INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3

PROJECT NO. & TITLE: 94013.05 INSTALL NEW FUEL OIL BOILERS

FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1120

ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 38045. | | |
| B. SIOH | $ 1902. | | |
| C. DESIGN COST | $ 1902. | | |
| D. TOTAL COST (1A+1B+1C) | $ 41849. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 41849. |

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

| FUEL | UNIT COST $/ MWH(1) | SAVINGS MWH/YR(2) | ANNUAL $ SAVINGS(3) | DISCOUNT FACTOR(4) | DISCOUNTED SAVINGS(5) |
|---|---|---|---|---|---|
| A. ELECT | $ 34.95 | 0. | $ 0. | 15.08 | $ 0. |
| B. DIST | $ 19.18 | 107. | $ 2047. | 18.57 | $ 38018. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | 0. | $ 0. | 18.58 | $ 0. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 107. | $ 2047. | | $ 38018. |

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

| | | |
|---|---|---|
| A. ANNUAL RECURRING (+/-) | | $ 500. |
| (1) DISCOUNT FACTOR (TABLE A) | 14.88 | |
| (2) DISCOUNTED SAVING/COST (3A X 3A1) | | $ 7440. |

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) | $ 7440. |
| 4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) | $ 2547. |
| 5. SIMPLE PAYBACK PERIOD (1G/4) | 16.43 YEARS |
| 6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) | $ 45458. |
| 7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= (IF < 1 PROJECT DOES NOT QUALIFY) | 1.09 |
| 8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): | 3.43 % |

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 181.42 | 4735.99 |
| SPACE COOL | 984.55 | 0.00 |
| HVAC AUX | 337.24 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1706.99 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 675.53 | 0.00 |
| TOTAL | 3885.73 | 4735.99 |

TOTAL SITE ENERGY 8621.56 MBTU 116.2 KBTU/SQFT-YR GROSS-AREA 116.2 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 16404.38 MBTU 221.1 KBTU/SQFT-YR GROSS-AREA 221.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.8
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 181.42 | 4371.68 |
| SPACE COOL | 984.55 | 0.00 |
| HVAC AUX | 337.24 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1706.99 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 675.53 | 0.00 |
| TOTAL | 3885.73 | 4371.68 |

TOTAL SITE ENERGY 8257.25 MBTU 111.3 KBTU/SQFT-YR GROSS-AREA 111.3 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 16040.07 MBTU 216.2 KBTU/SQFT-YR GROSS-AREA 216.2 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.8
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| | | | |
|---|---|---|---|
| Estimate: | BLDG 1120 ECO-5 | Date: | 22-Dec-94 |
| Description: | INSTALL OIL BOILER | | |
| Project: | ECIP / FEMP | Bid Date: | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 |
| Sq. footage: | | City indx: | Raleigh, NC |

| Line # | Description | | | | | |
|---|---|---|---|---|---|---|
| | Manhours | Matl | Labor | Equipment | Sub | Total |
| 1551207300 | HTG BLR OIL STL JCK&BRN HTW 2835MBH | | | | 1.00 Ea. | |
| Unit values | 141.00 | 26973.00 | 2253.63 | 0.00 | 0.00 | 29226.63 |
| Totals | 141.00 | $26,973 | $2,254 | $0 | $0 | $29,227 |
| U15 MECHANICAL | 141 | $26,973 | $2,254 | $0 | $0 | $29,227 |

| Line # Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| ESTIMATE TOTAL | 141 | $26,973 | $2,254 | $0 | $0 | $29,227 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $496 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $26,973 | $2,750 | $0 | $0 | $29,723 |
| CONTINGENCY | 15.00% | | | | | $4,458 |
| BOND | 3.00% | | | | | $892 |
| PROFIT | 10.00% | | | | | $2,972 |
| JOB TOTAL | | | | | | $38,045 |

Estimate: BLDG 1120 ECO-5 Date: 22-Dec-94
Description: INSTALL OIL BOILER
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U15 MECHANICAL | 141 | $26,973 | $2,254 | $0 | $0 | $29,227 |
| TOTAL | 141 | $26,973 | $2,254 | $0 | $0 | $29,227 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $496 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $26,973 | $2,750 | $0 | $0 | $29,723 |
| CONTINGENCY | 15.00% | | | | | $4,458 |
| BOND | 3.00% | | | | | $892 |
| PROFIT | 10.00% | | | | | $2,972 |
| JOB TOTAL | | | | | | $38,045 |

LIFE CYCLE COST ANALYSIS SUMMARY STUDY: ECO5
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 INSTALL NEW FUEL OIL BOILERS
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1127
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 43351. | | |
| B. SIOH | $ 2168. | | |
| C. DESIGN COST | $ 2168. | | |
| D. TOTAL COST (1A+1B+1C) | $ 47687. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 47687. |

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

| FUEL | UNIT COST $/ MWH(1) | SAVINGS MWH/YR(2) | ANNUAL $ SAVINGS(3) | DISCOUNT FACTOR(4) | DISCOUNTED SAVINGS(5) |
|---|---|---|---|---|---|
| A. ELECT | $ 34.95 | 0. | $ 0. | 15.08 | $ 0. |
| B. DIST | $ 19.18 | 78. | $ 1495. | 18.57 | $ 27753. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | 0. | $ 0. | 18.58 | $ 0. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 78. | $ 1495. | | $ 27753. |

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

| | | |
|---|---|---|
| A. ANNUAL RECURRING (+/-) | | $ 500. |
| (1) DISCOUNT FACTOR (TABLE A) | 14.88 | |
| (2) DISCOUNTED SAVING/COST (3A X 3A1) | | $ 7440. |

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) | $ 7440. |
| 4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) | $ 1995. |
| 5. SIMPLE PAYBACK PERIOD (1G/4) | 23.91 YEARS |
| 6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) | $ 35193. |
| 7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= (IF < 1 PROJECT DOES NOT QUALIFY) | .74 |
| 8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): | 1.45 % |

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 178.99 | 3457.19 |
| SPACE COOL | 1433.37 | 0.00 |
| HVAC AUX | 1108.49 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1512.83 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 566.01 | 0.00 |
| TOTAL | 4799.69 | 3457.19 |

TOTAL SITE ENERGY 8256.87 MBTU 142.9 KBTU/SQFT-YR GROSS-AREA 142.9 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 17870.65 MBTU 309.2 KBTU/SQFT-YR GROSS-AREA 309.2 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 48.6
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 1.3

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 178.99 | 3191.26 |
| SPACE COOL | 1433.37 | 0.00 |
| HVAC AUX | 1108.49 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1512.83 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 566.01 | 0.00 |
| TOTAL | 4799.69 | 3191.26 |

TOTAL SITE ENERGY 7990.93 MBTU 138.3 KBTU/SQFT-YR GROSS-AREA 138.3 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 17604.71 MBTU 304.6 KBTU/SQFT-YR GROSS-AREA 304.6 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 48.6
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 1.3

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

Estimate: BLDG 11207ECO-5 Date: 22-Dec-94
Description: INSTALL OIL BOILER
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC

| Line # | Description | | | | | |
|---|---|---|---|---|---|---|
| | Manhours | Matl | Labor | Equipment | Sub | Total |
| 1551207320 | HTG BLR OIL STL JCK&BRN HTW 3150MBH | | | | 1.00 Ea. | |
| Unit values | 184.00 | 30269.70 | 2949.38 | 0.00 | 0.00 | 33219.08 |
| Totals | 184.00 | $30,270 | $2,949 | $0 | $0 | $33,219 |
| U15 MECHANICAL | 184 | $30,270 | $2,949 | $0 | $0 | $33,219 |

| Line # Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| ESTIMATE TOTAL | 184 | $30,270 | $2,949 | $0 | $0 | $33,219 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $649 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $30,270 | $3,598 | $0 | $0 | $33,868 |
| CONTINGENCY | 15.00% | | | | | $5,080 |
| BOND | 3.00% | | | | | $1,016 |
| PROFIT | 10.00% | | | | | $3,387 |
| JOB TOTAL | | | | | | $43,351 |

Estimate: BLDG 1129 ECO-5 Date: 22-Dec-94
Description: INSTALL OIL BOILER
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U15 MECHANICAL | 184 | $30,270 | $2,949 | $0 | $0 | $33,219 |
| TOTAL | 184 | $30,270 | $2,949 | $0 | $0 | $33,219 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $649 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $30,270 | $3,598 | $0 | $0 | $33,868 |
| CONTINGENCY | 15.00% | | | | | $5,080 |
| BOND | 3.00% | | | | | $1,016 |
| PROFIT | 10.00% | | | | | $3,387 |
| JOB TOTAL | | | | | | $43,351 |

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: ECO5
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 INSTALL NEW FUEL OIL BOILERS
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1133
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 38045. | | |
| B. SIOH | $ 1902. | | |
| C. DESIGN COST | $ 1902. | | |
| D. TOTAL COST (1A+1B+1C) | $ 41849. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 41849. |

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

| FUEL | UNIT COST $/ MWH(1) | SAVINGS MWH/YR(2) | ANNUAL $ SAVINGS(3) | DISCOUNT FACTOR(4) | DISCOUNTED SAVINGS(5) |
|---|---|---|---|---|---|
| A. ELECT | $ 34.95 | 0. | $ 0. | 15.08 | $ 0. |
| B. DIST | $ 19.18 | 32. | $ 614. | 18.57 | $ 11401. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | 0. | $ 0. | 18.58 | $ 0. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 32. | $ 614. | | $ 11401. |

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

A. ANNUAL RECURRING (+/-) — $ 500.
(1) DISCOUNT FACTOR (TABLE A) — 14.88
(2) DISCOUNTED SAVING/COST (3A X 3A1) — $ 7440.

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) $ 7440.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) $ 1114.

5. SIMPLE PAYBACK PERIOD (1G/4) — 37.57 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) — $ 18841.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= .45
(IF < 1 PROJECT DOES NOT QUALIFY)
**** Project does not qualify for ECIP funding; 4,5,6 for information only.

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): N/A

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 425.53 | 1420.44 |
| SPACE COOL | 947.02 | 0.00 |
| HVAC AUX | 103.49 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1011.38 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 379.22 | 0.00 |
| TOTAL | 2866.64 | 1420.44 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 4286.99 MBTU | 115.9 KBTU/SQFT-YR GROSS-AREA | 115.9 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 10028.71 MBTU | 271.2 KBTU/SQFT-YR GROSS-AREA | 271.2 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.0
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 425.53 | 1311.18 |
| SPACE COOL | 947.02 | 0.00 |
| HVAC AUX | 103.49 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1011.38 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 379.22 | 0.00 |
| TOTAL | 2866.64 | 1311.18 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 4177.73 MBTU | 113.0 KBTU/SQFT-YR GROSS-AREA | 113.0 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 9919.44 MBTU | 268.3 KBTU/SQFT-YR GROSS-AREA | 268.3 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.0
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

Estimate: BLDG 1133 ECO-5 Date: 22-Dec-94
Description: INSTALL OIL BOILER
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC

| Line # | Description | | | | | |
|---|---|---|---|---|---|---|
| | Manhours | Matl | Labor | Equipment | Sub | Total |
| 1551207300 | HTG BLR OIL STL JCK&BRN HTW 2835MBH | | | | 1.00 Ea. | |
| Unit values | 141.00 | 26973.00 | 2253.63 | 0.00 | 0.00 | 29226.63 |
| Totals | 141.00 | $26,973 | $2,254 | $0 | $0 | $29,227 |
| U15 MECHANICAL | 141 | $26,973 | $2,254 | $0 | $0 | $29,227 |

| Line # Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| ESTIMATE TOTAL | 141 | $26,973 | $2,254 | $0 | $0 | $29,227 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $496 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $26,973 | $2,750 | $0 | $0 | $29,723 |
| CONTINGENCY | 15.00% | | | | | $4,458 |
| BOND | 3.00% | | | | | $892 |
| PROFIT | 10.00% | | | | | $2,972 |
| JOB TOTAL | | | | | | $38,045 |

Estimate: BLDG 1133 ECO-5 Date: 22-Dec-94
Description: INSTALL OIL BOILER
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U15 MECHANICAL | 141 | $26,973 | $2,254 | $0 | $0 | $29,227 |
| TOTAL | 141 | $26,973 | $2,254 | $0 | $0 | $29,227 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $496 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $26,973 | $2,750 | $0 | $0 | $29,723 |
| CONTINGENCY | 15.00% | | | | | $4,458 |
| BOND | 3.00% | | | | | $892 |
| PROFIT | 10.00% | | | | | $2,972 |
| JOB TOTAL | | | | | | $38,045 |

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: ECO5
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 INSTALL NEW FUEL OIL BOILERS
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1138
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 30251. | | |
| B. SIOH | $ 1513. | | |
| C. DESIGN COST | $ 1513. | | |
| D. TOTAL COST (1A+1B+1C) | $ 33277. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | $ 0. | | |
| F. PUBLIC UTILITY COMPANY REBATE | $ 0. | | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | $ | 33277. |

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

| FUEL | UNIT COST $/ MWH(1) | SAVINGS MWH/YR(2) | ANNUAL $ SAVINGS(3) | DISCOUNT FACTOR(4) | DISCOUNTED SAVINGS(5) |
|---|---|---|---|---|---|
| A. ELECT | $ 34.95 | 0. | $ 0. | 15.08 | $ 0. |
| B. DIST | $ 19.18 | 86. | $ 1655. | 18.57 | $ 30731. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | 0. | $ 0. | 18.58 | $ 0. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 86. | $ 1655. | | $ 30731. |

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

| | | | |
|---|---|---|---|
| A. ANNUAL RECURRING (+/-) | | | $ 500. |
| (1) DISCOUNT FACTOR (TABLE A) | | 14.88 | |
| (2) DISCOUNTED SAVING/COST (3A X 3A1) | | | $ 7440. |

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) | $ | 7440. |
| 4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) | $ | 2155. |
| 5. SIMPLE PAYBACK PERIOD (1G/4) | | 15.44 YEARS |
| 6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) | $ | 38171. |
| 7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= | | 1.15 |
| (IF < 1 PROJECT DOES NOT QUALIFY) | | |
| 8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): | | 3.71 % |

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 398.05 | 1053.81 |
| SPACE COOL | 344.03 | 0.00 |
| HVAC AUX | 373.27 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 466.41 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 325.45 | 0.00 |
| TOTAL | 1907.21 | 1053.81 |

TOTAL SITE ENERGY 2961.09 MBTU 91.3 KBTU/SQFT-YR GROSS-AREA 91.3 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 6781.38 MBTU 209.1 KBTU/SQFT-YR GROSS-AREA 209.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.1
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 40.62 | 873.22 |
| SPACE COOL | 489.12 | 0.00 |
| HVAC AUX | 399.71 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 664.40 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 669.36 | 0.00 |
| TOTAL | 2263.21 | 873.22 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 3136.42 MBTU | 165.3 KBTU/SQFT-YR GROSS-AREA | 165.3 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 7669.62 MBTU | 404.1 KBTU/SQFT-YR GROSS-AREA | 404.1 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 3.3
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 63.02 | 1901.29 |
| SPACE COOL | 324.06 | 0.00 |
| HVAC AUX | 453.90 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 664.37 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 669.34 | 0.00 |
| TOTAL | 2174.70 | 1901.29 |

TOTAL SITE ENERGY 4076.03 MBTU 214.8 KBTU/SQFT-YR GROSS-AREA 214.8 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 8432.04 MBTU 444.3 KBTU/SQFT-YR GROSS-AREA 444.3 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.6
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 398.05 | 972.75 |
| SPACE COOL | 344.03 | 0.00 |
| HVAC AUX | 373.27 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 466.41 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 325.45 | 0.00 |
| TOTAL | 1907.21 | 972.75 |

TOTAL SITE ENERGY 2880.03 MBTU 88.8 KBTU/SQFT-YR GROSS-AREA 88.8 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 6700.31 MBTU 206.6 KBTU/SQFT-YR GROSS-AREA 206.6 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.1
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE<br>IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 40.62 | 806.05 |
| SPACE COOL | 489.12 | 0.00 |
| HVAC AUX | 399.71 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 664.40 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 669.36 | 0.00 |
| TOTAL | 2263.21 | 806.05 |

TOTAL SITE ENERGY 3069.25 MBTU 161.7 KBTU/SQFT-YR GROSS-AREA 161.7 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 7602.45 MBTU 400.6 KBTU/SQFT-YR GROSS-AREA 400.6 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 3.3
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 63.02 | 1755.04 |
| SPACE COOL | 324.06 | 0.00 |
| HVAC AUX | 453.90 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 664.37 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 669.34 | 0.00 |
| TOTAL | 2174.70 | 1755.04 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 3929.78 MBTU | 207.1 KBTU/SQFT-YR GROSS-AREA | 207.1 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 8285.79 MBTU | 436.6 KBTU/SQFT-YR GROSS-AREA | 436.6 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.6
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| | | | |
|---|---|---|---|
| Estimate: | BLDG 1138 ECO-5 | Date: | 22-Dec-94 |
| Description: | INSTALL OIL BOILER | | |
| Project: | ECIP / FEMP | Bid Date: | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 |
| Sq. footage: | | City indx: | Raleigh, NC |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 1551207280 | HTG BLR OIL STL JCK&BRN HTW 2310MBH | | | | | 1.00 Ea. | |
| Unit values | | 100.00 | 21678.30 | 1603.25 | 0.00 | 0.00 | 23281.55 |
| Totals | | 100.00 | $21,678 | $1,603 | $0 | $0 | $23,281 |
| U15 MECHANICAL | | 100 | $21,678 | $1,603 | $0 | $0 | $23,281 |

| Line # | Description | | | | | |
|---|---|---|---|---|---|---|
| | Manhours | Matl | Labor | Equipment | Sub | Total |
| ESTIMATE TOTAL | 100 | $21,678 | $1,603 | $0 | $0 | $23,281 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $353 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $21,678 | $1,956 | $0 | $0 | $23,634 |
| CONTINGENCY | 15.00% | | | | | $3,545 |
| BOND | 3.00% | | | | | $709 |
| PROFIT | 10.00% | | | | | $2,363 |
| JOB TOTAL | | | | | | $30,251 |

Estimate: BLDG 1138 ECO-5 Date: 22-Dec-94
Description: INSTALL OIL BOILER
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U15 MECHANICAL | 100 | $21,678 | $1,603 | $0 | $0 | $23,281 |
| TOTAL | 100 | $21,678 | $1,603 | $0 | $0 | $23,281 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $353 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $21,678 | $1,956 | $0 | $0 | $23,634 |
| CONTINGENCY | 15.00% | | | | | $3,545 |
| BOND | 3.00% | | | | | $709 |
| PROFIT | 10.00% | | | | | $2,363 |
| JOB TOTAL | | | | | | $30,251 |

LIFE CYCLE COST ANALYSIS SUMMARY STUDY: ECO5
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 INSTALL NEW FUEL OIL -
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1549
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 80067. | | |
| B. SIOH | $ 4003. | | |
| C. DESIGN COST | $ 4003. | | |
| D. TOTAL COST (1A+1B+1C) | $ 88073. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 88073. |

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

| FUEL | UNIT COST $/ MWH(1) | SAVINGS MWH/YR(2) | ANNUAL $ SAVINGS(3) | DISCOUNT FACTOR(4) | DISCOUNTED SAVINGS(5) |
|---|---|---|---|---|---|
| A. ELECT | $ 34.95 | 16. | $ 545. | 15.08 | $ 8217. |
| B. DIST | $ 19.18 | 497. | $ 9523. | 18.57 | $ 176850. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | 0. | $ 0. | 18.58 | $ 0. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 512. | $ 10068. | | $ 185067. |

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

| | | | |
|---|---|---|---|
| A. ANNUAL RECURRING (+/-) | | | $ 500. |
| (1) DISCOUNT FACTOR (TABLE A) | | 14.88 | |
| (2) DISCOUNTED SAVING/COST (3A X 3A1) | | | $ 7440. |

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) $ 7440.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) $ 10568.

5. SIMPLE PAYBACK PERIOD (1G/4) 8.33 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) $ 192507.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 2.19
(IF < 1 PROJECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): 7.11 %

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 102.49 | 3805.53 |
| SPACE COOL | 0.00 | 0.00 |
| HVAC AUX | 52.17 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 661.50 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 94.60 | 0.00 |
| TOTAL | 910.77 | 3805.53 |

TOTAL SITE ENERGY 4716.32 MBTU 205.1 KBTU/SQFT-YR GROSS-AREA 205.1 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 6540.62 MBTU 284.4 KBTU/SQFT-YR GROSS-AREA 284.4 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 43.5
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 63.39 | 1948.51 |
| SPACE COOL | 0.00 | 0.00 |
| HVAC AUX | 38.09 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 661.48 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 94.60 | 0.00 |
| TOTAL | 857.56 | 1948.51 |

TOTAL SITE ENERGY 2806.11 MBTU 122.0 KBTU/SQFT-YR GROSS-AREA 122.0 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 4523.87 MBTU 196.7 KBTU/SQFT-YR GROSS-AREA 196.7 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 0.0
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.7

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

Estimate: BLDG 1549 ECO-45 Date: 03-Jan-95
Description: INFRARED HEATING
Project: LIMITED EEAP(RDBRKBid Date:
Location: FORT BRAGG, N.C. Job #: 94013.05
Sq. footage: 30000 City indx:Raleigh, NC

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 0913100200 | 115V, 20 AMP INFRARED HTG SYS POWER WIRING INCL CONDUIT, WIRE, AND RECEPTACLES | | | | | 1000.00 L.F. | |
| | Unit values | 0.15 | 2.15 | 2.98 | 0.00 | 0.00 | 5.13 |
| | Totals | 149.00 | $2,148 | $2,978 | $0 | $0 | $5,126 |
| A09 ELECTRICAL | | 149 | $2,148 | $2,978 | $0 | $0 | $5,126 |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 0205541750 | PAVEMENT REMOVAL, BITUMINOUS, 4" TO 6" THICK | | | | | 6.00 S.Y. | |
| | Unit values | 0.10 | 0.00 | 1.73 | 2.50 | 0.00 | 4.23 |
| | Totals | 0.57 | $0 | $10 | $15 | $0 | $25 |
| 0205543200 | SITE REMOVAL,STEEL PIPE,WELDED CONNECTION, UP TO 4"DIAMETER | | | | | 1000.00 L.F. | |
| | Unit values | 0.15 | 0.00 | 2.61 | 1.06 | 0.00 | 3.68 |
| | Totals | 150.00 | $0 | $2,613 | $1,064 | $0 | $3,677 |
| 0208400600 | REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE | | | | | 100.00 L.F. | |
| | Unit values | 0.07 | 0.00 | 1.63 | 0.20 | 0.00 | 1.83 |
| | Totals | 7.10 | $0 | $163 | $20 | $0 | $183 |
| 0208401000 | REMOVE INSULATION FROM PIPE FITTING, UP TO 4" DIAMETER PIPE | | | | | 25.00 Ea. | |
| | Unit values | 0.20 | 0.00 | 4.60 | 0.56 | 0.00 | 5.16 |
| | Totals | 5.00 | $0 | $115 | $14 | $0 | $129 |
| 0222541900 | TAMPING TRENCH B'FILL, VIBRATING PLATE, ADD | | | | | 6.00 C.Y. | |
| | Unit values | 0.09 | 0.00 | 1.44 | 0.55 | 0.00 | 1.99 |
| | Totals | 0.53 | $0 | $9 | $3 | $0 | $12 |
| 0222582800 | TRENCH EXCVTNG 40HP CHNTRNCHR&BKFL 12"W24"D | | | | | 6.00 L.F. | |
| | Unit values | 0.01 | 0.00 | 0.20 | 0.20 | 0.00 | 0.39 |
| | Totals | 0.06 | $0 | $1 | $1 | $0 | $2 |
| 0251040380 | ASPHALTIC CONCRETE PAVEMENT, PAVING, WEARING COURSE, 2" THICK | | | | | 6.00 S.Y. | |
| | Unit values | 0.02 | 2.96 | 0.27 | 0.25 | 0.00 | 3.48 |
| | Totals | 0.09 | $18 | $2 | $1 | $0 | $21 |
| 0260120200 | BEDDING, FOR PIPE IN TRENCH SAND, DEAD OR BANK | | | | | 6.00 C.Y. | |
| | Unit values | 0.16 | 3.79 | 2.79 | 1.13 | 0.00 | 7.71 |
| | Totals | 0.96 | $23 | $17 | $7 | $0 | $47 |
| 0260120500 | BEDDING, PLACING IN TRENCH | | | | | 6.00 C.Y. | |
| | Unit values | 0.09 | 0.00 | 1.44 | 0.55 | 0.00 | 1.99 |
| | Totals | 0.53 | $0 | $9 | $3 | $0 | $12 |
| 0266907800 | CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | 1.00 | Ea. |
| Unit values | 1.56 | 404.00 | 29.36 | 4.89 | 0.00 | 438.25 |
| Totals | 1.56 | $404 | $29 | $5 | $0 | $438 |
| 0268520150 | GAS SERVICE & DISTRIB PIPING,POLYETHYLENE,60-PSI 1-1/4"DIAM SDR 10,COIL | | | | 55.00 | L.F. |
| Unit values | 0.06 | 0.63 | 1.10 | 0.00 | 0.00 | 1.72 |
| Totals | 3.30 | $34 | $60 | $0 | $0 | $94 |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| U02 SITEWORK | | 170 | $479 | $3,028 | $1,133 | $0 | $4,640 |
| 1517010650 | BLACK STEEL PIPE, SCHEDULE 40, THREADED, 4" DIAM W/CPLGS & HNGRS 10'OC | | | | | 800.00 L.F. | |
| Unit values | | 0.44 | 13.49 | 6.84 | 0.00 | 0.00 | 20.32 |
| Totals | | 355.20 | $10,789 | $5,469 | $0 | $0 | $16,258 |
| 1517011320 | PIPE STEEL GALV SCH 40 THRD W/CPLG & HNGR SZD FOR CVRG 10'OC 3/4" DIAM | | | | | 1300.00 L.F. | |
| Unit values | | 0.13 | 1.90 | 2.24 | 0.00 | 0.00 | 4.14 |
| Totals | | 170.30 | $2,468 | $2,918 | $0 | $0 | $5,386 |
| 1519010320 | ALUMINUM REFLECTORS WITH HANGERS | | | | | 85.00 Ea. | |
| Unit values | | 0.05 | 39.75 | 2.87 | 0.00 | 0.00 | 42.62 |
| Totals | | 4.25 | $3,379 | $244 | $0 | $0 | $3,623 |
| 1524105040 | INFRARED HTG SYS VACUUM PUMP AND VENT PIPING | | | | | 4.00 Ea. | |
| Unit values | | 3.00 | 737.61 | 90.75 | 0.00 | 0.00 | 828.36 |
| Totals | | 12.00 | $2,950 | $363 | $0 | $0 | $3,313 |
| 1552301020 | INFRARED HTG SYS GAS FIRED BURNER, 100 MBH, AND COMBUSTION CHAMBER | | | | | 24.00 Ea. | |
| Unit values | | 1.00 | 859.14 | 33.28 | 0.00 | 0.00 | 892.42 |
| Totals | | 24.00 | $20,619 | $799 | $0 | $0 | $21,418 |
| 1562600135 | GAS APPLIANCE REGULATORS DOUBLE DIAPHRAGM TYPE 3/4" PIPE SIZE FOR ROOFTP HVAC UN | | | | | 2.00 Ea. | |
| Unit values | | 0.40 | 54.95 | 6.84 | 0.00 | 0.00 | 61.78 |
| Totals | | 0.80 | $110 | $14 | $0 | $0 | $124 |
| 1562600137 | GAS APPLIANCE REGULATORS DOUBLE DIAPHRAGM TYPE 1-1/4" PIPE SIZE , FOR BLDG GAS S | | | | | 1.00 Ea. | |
| Unit values | | 0.53 | 225.77 | 9.14 | 0.00 | 0.00 | 234.91 |
| Totals | | 0.53 | $226 | $9 | $0 | $0 | $235 |
| U15 MECHANICAL | | 568 | $40,541 | $9,816 | $0 | $0 | $50,357 |

| Line # | Description | | | | | |
|---|---|---|---|---|---|---|
| | Manhours | Matl | Labor | Equipment | Sub | Total |
| 1631200100 | INFRARED HEATING SYS POWER / CONTROL PANEL | | | | 4.00 Ea. | |
| Unit values | 2.96 | 320.72 | 45.97 | 0.00 | 0.00 | 366.69 |
| Totals | 11.85 | $1,283 | $184 | $0 | $0 | $1,467 |
| U16 ELECTRICAL | 12 | $1,283 | $184 | $0 | $0 | $1,467 |

| Line # Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| ESTIMATE TOTAL | 899 | $44,451 | $16,006 | $1,133 | $0 | $61,590 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 0.00% | | $0 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 0.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $44,451 | $16,006 | $1,133 | $0 | $61,590 |
| CONTINGENCY | 20.00% | | | | | $12,318 |
| BOND | 0.00% | | | | | $0 |
| PROFIT | 10.00% | | | | | $6,159 |
| JOB TOTAL | | | | | | $80,067 |

Estimate: BLDG 1549 ECO-#5 Date: 03-Jan-95
Description: INFRARED HEATING
Project: LIMITED EEAP(RDBRKBid Date:
Location: FORT BRAGG, N.C. Job #: 94013.05
Sq. footage: 30000 City indx:Raleigh, NC

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| A09 ELECTRICAL | 149 | $2,148 | $2,978 | $0 | $0 | $5,126 |
| U02 SITEWORK | 170 | $479 | $3,028 | $1,133 | $0 | $4,640 |
| U15 MECHANICAL | 568 | $40,541 | $9,816 | $0 | $0 | $50,357 |
| U16 ELECTRICAL | 12 | $1,283 | $184 | $0 | $0 | $1,467 |
| TOTAL | 899 | $44,451 | $16,006 | $1,133 | $0 | $61,590 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 0.00% | | $0 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 0.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $44,451 | $16,006 | $1,133 | $0 | $61,590 |
| CONTINGENCY | 20.00% | | | | | $12,318 |
| BOND | 0.00% | | | | | $0 |
| PROFIT | 10.00% | | | | | $6,159 |
| JOB TOTAL | | | | | | $80,067 |

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: ECO5
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 INSTALL NEW FUEL OIL BOILERS
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1728
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 38045. | | |
| B. SIOH | $ 1902. | | |
| C. DESIGN COST | $ 1902. | | |
| D. TOTAL COST (1A+1B+1C) | $ 41849. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 41849. |

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

| FUEL | UNIT COST $/ MWH(1) | SAVINGS MWH/YR(2) | ANNUAL $ SAVINGS(3) | DISCOUNT FACTOR(4) | DISCOUNTED SAVINGS(5) |
|---|---|---|---|---|---|
| A. ELECT | $ 34.95 | 0. | $ 0. | 15.08 | $ 0. |
| B. DIST | $ 19.18 | 68. | $ 1312. | 18.57 | $ 24369. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | 0. | $ 0. | 18.58 | $ 0. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 68. | $ 1312. | | $ 24369. |

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

| | | |
|---|---|---|
| A. ANNUAL RECURRING (+/-) | | $ 500. |
| (1) DISCOUNT FACTOR (TABLE A) | 14.88 | |
| (2) DISCOUNTED SAVING/COST (3A X 3A1) | | $ 7440. |

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) | $ 7440. |
| 4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) | $ 1812. |
| 5. SIMPLE PAYBACK PERIOD (1G/4) | 23.09 YEARS |
| 6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) | $ 31809. |
| 7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= (IF < 1 PROJECT DOES NOT QUALIFY) | .76 |
| 8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): | 1.60 % |

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 133.98 | 3035.71 |
| SPACE COOL | 1096.12 | 0.00 |
| HVAC AUX | 1466.37 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1672.31 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 994.36 | 0.00 |
| TOTAL | 5363.14 | 3035.71 |

TOTAL SITE ENERGY 8398.77 MBTU 112.3 KBTU/SQFT-YR GROSS-AREA 112.3 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 19140.97 MBTU 255.8 KBTU/SQFT-YR GROSS-AREA 255.8 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 2.4
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 133.98 | 2802.20 |
| SPACE COOL | 1096.12 | 0.00 |
| HVAC AUX | 1466.37 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1672.31 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 994.36 | 0.00 |
| TOTAL | 5363.14 | 2802.20 |

TOTAL SITE ENERGY 8165.25 MBTU 109.1 KBTU/SQFT-YR GROSS-AREA 109.1 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 18907.46 MBTU 252.7 KBTU/SQFT-YR GROSS-AREA 252.7 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 2.4
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

Estimate: BLDG 1728 ECO-5 Date: 22-Dec-94
Description: INSTALL OIL BOILER
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx: Raleigh, NC

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 1551207300 | HTG BLR OIL STL JCK&BRN HTW 2835MBH | | | | | 1.00 Ea. | |
| | Unit values | 141.00 | 26973.00 | 2253.63 | 0.00 | 0.00 | 29226.63 |
| | Totals | 141.00 | $26,973 | $2,254 | $0 | $0 | $29,227 |
| U15 MECHANICAL | | 141 | $26,973 | $2,254 | $0 | $0 | $29,227 |

| Line # Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| ESTIMATE TOTAL | 141 | $26,973 | $2,254 | $0 | $0 | $29,227 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $496 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $26,973 | $2,750 | $0 | $0 | $29,723 |
| CONTINGENCY | 15.00% | | | | | $4,458 |
| BOND | 3.00% | | | | | $892 |
| PROFIT | 10.00% | | | | | $2,972 |
| JOB TOTAL | | | | | | $38,045 |

Estimate: BLDG 1728 ECO-5 Date: 22-Dec-94
Description: INSTALL OIL BOILER
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U15 MECHANICAL | 141 | $26,973 | $2,254 | $0 | $0 | $29,227 |
| TOTAL | 141 | $26,973 | $2,254 | $0 | $0 | $29,227 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $496 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $26,973 | $2,750 | $0 | $0 | $29,723 |
| CONTINGENCY | 15.00% | | | | | $4,458 |
| BOND | 3.00% | | | | | $892 |
| PROFIT | 10.00% | | | | | $2,972 |
| JOB TOTAL | | | | | | $38,045 |

LIFE CYCLE COST ANALYSIS SUMMARY STUDY: ECO5
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 INSTALL NEW FUEL OIL BOILERS
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1731
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 38045. | | |
| B. SIOH | $ 1902. | | |
| C. DESIGN COST | $ 1902. | | |
| D. TOTAL COST (1A+1B+1C) | $ 41849. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 41849. |

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

| FUEL | UNIT COST $/ MWH(1) | SAVINGS MWH/YR(2) | ANNUAL $ SAVINGS(3) | DISCOUNT FACTOR(4) | DISCOUNTED SAVINGS(5) |
|---|---|---|---|---|---|
| A. ELECT | $ 34.95 | -3. | $ -94. | 15.08 | $ -1423. |
| B. DIST | $ 19.18 | 56. | $ 1081. | 18.57 | $ 20067. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | 0. | $ 0. | 18.58 | $ 0. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 54. | $ 986. | | $ 18644. |

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

| | | | |
|---|---|---|---|
| A. ANNUAL RECURRING (+/-) | | | $ 500. |
| (1) DISCOUNT FACTOR (TABLE A) | | 14.88 | |
| (2) DISCOUNTED SAVING/COST (3A X 3A1) | | | $ 7440. |

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) | $ 7440. |
| 4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) | $ 1486. |
| 5. SIMPLE PAYBACK PERIOD (1G/4) | 28.16 YEARS |
| 6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) | $ 26084. |
| 7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= | .62 |

(IF < 1 PROJECT DOES NOT QUALIFY)
**** Project does not qualify for ECIP funding; 4,5,6 for information only.

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): N/A

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 40.00 | 764.80 |
| SPACE COOL | 597.47 | 0.00 |
| HVAC AUX | 159.66 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 737.12 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 430.90 | 0.00 |
| TOTAL | 1965.15 | 764.80 |

TOTAL SITE ENERGY 2729.95 MBTU 123.9 KBTU/SQFT-YR GROSS-AREA 123.9 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 6666.15 MBTU 302.5 KBTU/SQFT-YR GROSS-AREA 302.5 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 9.7
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE<br>IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 31.12 | 601.04 |
| SPACE COOL | 598.57 | 0.00 |
| HVAC AUX | 399.31 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 569.71 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 312.40 | 0.00 |
| TOTAL | 1911.12 | 601.04 |

TOTAL SITE ENERGY 2512.19 MBTU 109.8 KBTU/SQFT-YR GROSS-AREA 109.8 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 6340.23 MBTU 277.0 KBTU/SQFT-YR GROSS-AREA 277.0 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.4
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 32.17 | 621.20 |
| SPACE COOL | 601.67 | 0.00 |
| HVAC AUX | 402.21 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 569.72 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 306.02 | 0.00 |
| TOTAL | 1911.79 | 621.20 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 2532.99 MBTU | 110.7 KBTU/SQFT-YR GROSS-AREA | 110.7 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 6362.32 MBTU | 278.0 KBTU/SQFT-YR GROSS-AREA | 278.0 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.3
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE<br>IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 40.00 | 705.97 |
| SPACE COOL | 597.47 | 0.00 |
| HVAC AUX | 159.66 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 737.12 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 430.90 | 0.00 |
| TOTAL | 1965.15 | 705.97 |

TOTAL SITE ENERGY 2671.12 MBTU 121.2 KBTU/SQFT-YR GROSS-AREA 121.2 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 6607.32 MBTU 299.8 KBTU/SQFT-YR GROSS-AREA 299.8 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 9.7
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 29.95 | 533.97 |
| SPACE COOL | 601.67 | 0.00 |
| HVAC AUX | 413.62 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 569.72 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 306.02 | 0.00 |
| TOTAL | 1920.99 | 533.97 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 2454.97 MBTU | 107.3 KBTU/SQFT-YR GROSS-AREA | 107.3 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 6302.72 MBTU | 275.4 KBTU/SQFT-YR GROSS-AREA | 275.4 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.3
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE<br>IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 31.12 | 554.80 |
| SPACE COOL | 598.57 | 0.00 |
| HVAC AUX | 399.31 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 569.71 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 312.40 | 0.00 |
| TOTAL | 1911.12 | 554.80 |

TOTAL SITE ENERGY 2465.95 MBTU 107.7 KBTU/SQFT-YR GROSS-AREA 107.7 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 6294.00 MBTU 275.0 KBTU/SQFT-YR GROSS-AREA 275.0 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.4
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| | | | |
|---|---|---|---|
| Estimate: | BLDG 1731 ECO-5 | Date: | 22-Dec-94 |
| Description: | INSTALL OIL BOILER | | |
| Project: | ECIP / FEMP | Bid Date: | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 |
| Sq. footage: | | City indx: | Raleigh, NC |

| Line # | Description | | | | | |
|---|---|---|---|---|---|---|
| | Manhours | Matl | Labor | Equipment | Sub | Total |
| 1551207300 | HTG BLR OIL STL JCK&BRN HTW 2835MBH | | | | 1.00 Ea. | |
| Unit values | 141.00 | 26973.00 | 2253.63 | 0.00 | 0.00 | 29226.63 |
| Totals | 141.00 | $26,973 | $2,254 | $0 | $0 | $29,227 |
| U15 MECHANICAL | 141 | $26,973 | $2,254 | $0 | $0 | $29,227 |

| Line # Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| ESTIMATE TOTAL | 141 | $26,973 | $2,254 | $0 | $0 | $29,227 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $496 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $26,973 | $2,750 | $0 | $0 | $29,723 |
| CONTINGENCY | 15.00% | | | | | $4,458 |
| BOND | 3.00% | | | | | $892 |
| PROFIT | 10.00% | | | | | $2,972 |
| JOB TOTAL | | | | | | $38,045 |

Estimate: BLDG 1731 ECO-5 Date: 22-Dec-94
Description: INSTALL OIL BOILER
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U15 MECHANICAL | 141 | $26,973 | $2,254 | $0 | $0 | $29,227 |
| TOTAL | 141 | $26,973 | $2,254 | $0 | $0 | $29,227 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $496 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $26,973 | $2,750 | $0 | $0 | $29,723 |
| CONTINGENCY | 15.00% | | | | | $4,458 |
| BOND | 3.00% | | | | | $892 |
| PROFIT | 10.00% | | | | | $2,972 |
| JOB TOTAL | | | | | | $38,045 |

This section contains the life-cycle cost analyses, energy calculations, and cost estimates for ECO-6: HVAC Renovation. For the buildings in this ECO, multiple options have been calculated when applicable. These options include:

1. Install new variable air volume (VAV) air handlers
2. Install more efficient chillers
3. Install central VAV air handling units to replace window units

A single life-cycle cost analysis and cost estimate was performed for each building which grouped all applicable options together.

# TABLE OF CONTENTS

# LIFE CYCLE COST ANALYSIS SUMMARY
# FEDERAL ENERGY MANAGEMENT PROGRAM (FEMP)

| | |
|---|---|
| **DISCRETE PORTION NAME:** | Fort Bragg, NC |
| **PROJECT NAME:** | HVAC Renovations in Historic Red Brick Area |
| **TOTAL INVESTMENT:** | $1,591,477 |
| **MBTU/YEAR SAVED:** | 3,164 |
| **DISCOUNTED ENERGY SAVINGS:** | $1,212,880 |
| **DISCOUNTED DEMAND SAVINGS:** | 0 |
| **TOTAL ENERGY SAVINGS:** | $1,212,880 |
| **TOTAL NON-ENERGY SAVINGS:** | $1,189,671 |
| **FIRST YEAR DOLLAR SAVINGS:** | $148,958 |
| **SIMPLE PAYBACK IN YEARS:** | 10.68 |
| **TOTAL NET SAVINGS:** | $2,402,551 |
| **SAVINGS TO INVESTMENT RATIO:** | 1.51 |

**REQUIREMENT:**
This project encompasses a number of different modifications to HVAC systems. The evaluation applies only to areas which are both heated and cooled within each building. Where existing HVAC systems used chilled water, the renovations incorporated chilled water replacement components. Similarly, if the existing system was a direct-expansion (DX) system the replacement incorporated DX units. The completion of this project will save Fort Bragg 927 MWH of energy and $148,958 annually to help meet the requirements of the Energy Policy Act of 1992 (PL 102-486). This act states that Fort Bragg must achieve a 30% reduction in its energy consumption from FY 1985 to the FY 2005.

**DESCRIPTION OF PROPOSED CONSTRUCTION:**
This project includes replacing air handlers with new VAV air handlers and replacing chillers with more energy efficient chillers. The project also proposes replacing window air conditioners with packaged DX variable-air volume air handlers.

**CURRENT CONDITIONS:**
The energy lost due to the current usage of inefficient HVAC systems is in excess of 927 MWH per year and costs $148,958 per year. At this rate a more energy efficient HVAC system would pay for itself in approximately 10.68 years.

**IMPACT IF NOT PROVIDED:**
If this project is not funded, Fort Bragg will continue to spend in additional utility and operating costs over the next 10.68 years enough to purchase the more efficient HVAC systems. Also, if this project is not funded, Fort Bragg will have more difficulty meeting the mandates of the Energy Policy Act of 1992(PL 102-486).

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: ECO6
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 ECO 6 : HVAC RENOVATIONS
FISCAL YEAR 95 DISCRETE PORTION NAME: ECO6-TOTAL
ANALYSIS DATE: 04-19-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 1446799. | | |
| B. SIOH | $ 72339. | | |
| C. DESIGN COST | $ 72339. | | |
| D. TOTAL COST (1A+1B+1C) | $ 1591477. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 1591477. |

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 | $ 34.95 | 503. | $ 17580. | 15.08 | $ 265104. |
| B. DIST | $ 19.18 | 2661. | $ 51038. | 18.57 | $ 947775. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | 0. | $ 0. | 18.58 | $ 0. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 3164. | $ 68618. | | $ 1212880. |

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

| | | |
|---|---|---|
| A. ANNUAL RECURRING (+/-) | | $ 8000. |
| (1) DISCOUNT FACTOR (TABLE A) | 14.88 | |
| (2) DISCOUNTED SAVING/COST (3A X 3A1) | | $ 119040. |

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

| ITEM | SAVINGS(+) COST(-) (1) | YR OC (2) | DISCNT FACTR (3) | DISCOUNTED SAVINGS(+)/ COST(-)(4) |
|---|---|---|---|---|
| 1. FUTURE RENOVATION | $1446799. | 10 | .74 | 1070631. |
| d. TOTAL | $1446799. | | | 1070631. |

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4) $ 1189671.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) $ 148958.

5. SIMPLE PAYBACK PERIOD (1G/4) 10.68 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) $ 2402551.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 1.51
(IF < 1 PROJECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): 5.14 %

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: ECO6
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 ECO 6 : HVAC RENOVATIONS
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 1-1242
ANALYSIS DATE: 03-16-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 68804. | | |
| B. SIOH | $ 3440. | | |
| C. DESIGN COST | $ 3440. | | |
| D. TOTAL COST (1A+1B+1C) | $ 75684. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 75684. |

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 | $ 34.95 | -11. | $ -379. | 15.08 | $ -5713. |
| B. DIST | $ 19.18 | 198. | $ 3794. | 18.57 | $ 70458. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | 0. | $ 0. | 18.58 | $ 0. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 187. | $ 3415. | | $ 64745. |

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

A. ANNUAL RECURRING (+/-) $ 1000.
(1) DISCOUNT FACTOR (TABLE A) 14.88
(2) DISCOUNTED SAVING/COST (3A X 3A1) $ 14880.

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

| ITEM | SAVINGS(+) COST(-) (1) | YR OC (2) | DISCNT FACTR (3) | DISCOUNTED SAVINGS(+)/ COST(-)(4) |
|---|---|---|---|---|
| 1. FUTURE RENOVATIONS | $ 75437. | 10 | .74 | 55823. |
| d. TOTAL | $ 75437. | | | 55823. |

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4) $ 70703.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) $ 8187.

5. SIMPLE PAYBACK PERIOD (1G/4) 9.24 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) $ 135448.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 1.79
(IF < 1 PROJECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): 6.04 %

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 68.66 | 1328.59 |
| SPACE COOL | 310.70 | 0.00 |
| HVAC AUX | 369.70 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 622.17 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 242.60 | 0.00 |
| TOTAL | 1613.84 | 1328.59 |

TOTAL SITE ENERGY 3048.69 MBTU 158.5 KBTU/SQFT-YR GROSS-AREA 158.5 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 6494.06 MBTU 337.5 KBTU/SQFT-YR GROSS-AREA 337.5 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.0
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

FT BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 1/12/1995 9:26:59 PDL RUN 1
BUILDING 1242 ECO-6 HVAC RENOVATIONS
REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE WEATHER FILE- RALEIGH, NC

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 33.83 | 653.42 |
| SPACE COOL | 471.39 | 0.00 |
| HVAC AUX | 280.82 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 622.17 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 242.60 | 0.00 |
| TOTAL | 1650.82 | 653.42 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 2410.52 MBTU | 125.3 KBTU/SQFT-YR GROSS-AREA | 125.3 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 5929.99 MBTU | 308.2 KBTU/SQFT-YR GROSS-AREA | 308.2 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.7
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

Estimate: BLDG 1242 ECO-6 Date: 16-Mar-95
Description: HVAC RENOVATIONS
Project: ECIP / FEMP Bid Date:
Location: FT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 1556513060 | HTGINSL DUK BLKT 1"FGLS 1.5#DENSE | | | | | 800.00 S.F. | |
| | Unit values | 0.05 | 0.50 | 0.67 | 0.00 | 0.00 | 1.17 |
| | Totals | 36.80 | $400 | $537 | $0 | $0 | $937 |
| 1571251550 | CENTRAL STATION CHILLED WATER AHU 10,000 CFM MODULAR | | | | | 1.00 Ea. | |
| | Unit values | 44.44 | 4970.03 | 710.88 | 0.00 | 0.00 | 5680.90 |
| | Totals | 44.44 | $4,970 | $711 | $0 | $0 | $5,681 |
| 1571900520 | WATER CHILLER RECIPROCATING AIR COOLED 40 TON | | | | | 1.00 Ea. | |
| | Unit values | 133.00 | 19180.80 | 2178.00 | 0.00 | 0.00 | 21358.80 |
| | Totals | 133.00 | $19,181 | $2,178 | $0 | $0 | $21,359 |
| 1572010390 | COIL WATER/CONDENSER 3/8" COP TUBE AL FIN 2ROWX8FIN 24" X 72" | | | | | 1.00 Ea. | |
| | Unit values | 12.03 | 689.31 | 184.53 | 0.00 | 0.00 | 873.84 |
| | Totals | 12.03 | $689 | $185 | $0 | $0 | $874 |
| 1572010430 | COIL WATER/CONDENSER 3/8" COP TUBE AL FIN 2ROWX8FIN 30" X 84" | | | | | 1.00 Ea. | |
| | Unit values | 17.78 | 844.16 | 275.28 | 0.00 | 0.00 | 1119.43 |
| | Totals | 17.78 | $844 | $275 | $0 | $0 | $1,119 |
| 1572500580 | Galv. steel rectangular duct, incl. ftngs., hangers, over 5,000 lb. | | | | | 1500.00 Lb. | |
| | Unit values | 0.08 | 0.36 | 1.30 | 0.00 | 0.00 | 1.66 |
| | Totals | 126.00 | $539 | $1,951 | $0 | $0 | $2,490 |
| 1574200001 | VAV CONTROL PACKAGE - DDC | | | | | 1.00 LOT | |
| | Unit values | 0.00 | 5500.00 | 800.00 | 0.00 | 0.00 | 6300.00 |
| | Totals | 0.00 | $5,500 | $800 | $0 | $0 | $6,300 |
| 1574200003 | VARIABLE SPEED DRIVE 15 HP | | | | | 1.00 EA | |
| | Unit values | 0.00 | 2000.00 | 500.00 | 0.00 | 0.00 | 2500.00 |
| | Totals | 0.00 | $2,000 | $500 | $0 | $0 | $2,500 |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| U15 MECHANICAL | | 371 | $34,123 | $7,137 | $0 | $0 | $41,260 |
| 1681303700 | VAV BOXES 800 CFM | | | | | 8.00 EA | |
| Unit values | | 0.00 | 1200.00 | 100.00 | 0.00 | 0.00 | 1300.00 |
| Totals | | 0.00 | $9,600 | $800 | $0 | $0 | $10,400 |
| 1681303800 | ELEC THERMOSTAT LINE | | | | | 8.00 Ea. | |
| Unit values | | 1.00 | 24.54 | 15.51 | 0.00 | 0.00 | 40.05 |
| Totals | | 8.00 | $196 | $124 | $0 | $0 | $320 |
| U16 ELECTRICAL | | 8 | $9,796 | $924 | $0 | $0 | $10,720 |

| Line # Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| ESTIMATE TOTAL | 379 | $43,919 | $8,061 | $0 | $0 | $51,980 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $1,773 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $43,919 | $9,834 | $0 | $0 | $53,753 |
| CONTINGENCY | 15.00% | | | | | $8,063 |
| BOND | 3.00% | | | | | $1,613 |
| PROFIT | 10.00% | | | | | $5,375 |
| JOB TOTAL | | | | | | $68,804 |

Estimate: BLDG 1242 ECO-6 Date: 16-Mar-95
Description: HVAC RENOVATIONS
Project: ECIP / FEMP Bid Date:
Location: FT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U15 MECHANICAL | 371 | $34,123 | $7,137 | $0 | $0 | $41,260 |
| U16 ELECTRICAL | 8 | $9,796 | $924 | $0 | $0 | $10,720 |
| TOTAL | 379 | $43,919 | $8,061 | $0 | $0 | $51,980 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $1,773 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $43,919 | $9,834 | $0 | $0 | $53,753 |
| CONTINGENCY | 15.00% | | | | | $8,063 |
| BOND | 3.00% | | | | | $1,613 |
| PROFIT | 10.00% | | | | | $5,375 |
| JOB TOTAL | | | | | | $68,804 |

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: ECO6
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 ECO 6 : HVAC RENOVATIONS
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 1-1326
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 392648. | | |
| B. SIOH | $ 19632. | | |
| C. DESIGN COST | $ 19632. | | |
| D. TOTAL COST (1A+1B+1C) | $ 431912. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 431912. |

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 | $ 34.95 | 310. | $ 10841. | 15.08 | $ 163484. |
| B. DIST | $ 19.18 | 641. | $ 12295. | 18.57 | $ 228324. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | 0. | $ 0. | 18.58 | $ 0. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 951. | $ 23136. | | $ 391809. |

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

| | | |
|---|---|---|
| A. ANNUAL RECURRING (+/-) | | $ 1000. |
| (1) DISCOUNT FACTOR (TABLE A) | 14.88 | |
| (2) DISCOUNTED SAVING/COST (3A X 3A1) | | $ 14880. |

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

| ITEM | SAVINGS(+) COST(-) (1) | YR OC (2) | DISCNT FACTR (3) | DISCOUNTED SAVINGS(+)/ COST(-)(4) |
|---|---|---|---|---|
| 1. FUTURE RENOVATIONS | $ 392648. | 10 | .74 | 290560. |
| d. TOTAL | $ 392648. | | | 290560. |

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4) $ 305440.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) $ 43769.

5. SIMPLE PAYBACK PERIOD (1G/4) 9.87 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) $ 697248.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 1.61
(IF < 1 PROJECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): 5.50 %

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 285.53 | 5085.34 |
| SPACE COOL | 1748.59 | 0.00 |
| HVAC AUX | 1223.96 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1903.50 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 1087.17 | 0.00 |
| TOTAL | 6248.75 | 5085.34 |

TOTAL SITE ENERGY 11333.96 MBTU 192.0 KBTU/SQFT-YR GROSS-AREA 192.0 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 23849.96 MBTU 404.0 KBTU/SQFT-YR GROSS-AREA 404.0 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 36.3
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 141.65 | 2896.45 |
| SPACE COOL | 1251.83 | 0.00 |
| HVAC AUX | 805.91 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1903.51 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 1087.17 | 0.00 |
| TOTAL | 5190.07 | 2896.45 |

TOTAL SITE ENERGY 8086.31 MBTU 137.0 KBTU/SQFT-YR GROSS-AREA 137.0 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 18481.62 MBTU 313.1 KBTU/SQFT-YR GROSS-AREA 313.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 31.1
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| | | | | |
|---|---|---|---|---|
| Estimate: | BLDG 1326 ECO-6 | Date: | 22-Dec-94 | |
| Description: | HVAC RENOVATIONS | | | |
| Project: | ECIP / FEMP | Bid Date: | | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 | |
| Sq. footage: | | City indx: | Raleigh, NC | |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 1556513060 | HTGINSL DUK BLKT 1"FGLS 1.5#DENSE | | | | | 6000.00 S.F. | |
| Unit values | | 0.05 | 0.50 | 0.67 | 0.00 | 0.00 | 1.17 |
| Totals | | 276.00 | $2,997 | $4,029 | $0 | $0 | $7,026 |
| 1571251550 | CENTRAL STATION CHILLED WATER AHU 10,000 CFM MODULAR | | | | | 7.00 Ea. | |
| Unit values | | 44.44 | 4970.03 | 710.88 | 0.00 | 0.00 | 5680.90 |
| Totals | | 311.11 | $34,790 | $4,976 | $0 | $0 | $39,766 |
| 1571900650 | WATER CHILLER RECIPROCATING AIR COOLED 175 TON | | | | | 1.00 Ea. | |
| Unit values | | 533.00 | 87412.50 | 8712.00 | 517.28 | 0.00 | 96641.78 |
| Totals | | 533.00 | $87,413 | $8,712 | $517 | $0 | $96,642 |
| 1572010390 | COIL WATER/CONDENSER 3/8" COP TUBE AL FIN 2ROWX8FIN 24" X 72" | | | | | 7.00 Ea. | |
| Unit values | | 12.03 | 689.31 | 184.53 | 0.00 | 0.00 | 873.84 |
| Totals | | 84.21 | $4,825 | $1,292 | $0 | $0 | $6,117 |
| 1572010430 | COIL WATER/CONDENSER 3/8" COP TUBE AL FIN 2ROWX8FIN 30" X 84" | | | | | 7.00 Ea. | |
| Unit values | | 17.78 | 844.16 | 275.28 | 0.00 | 0.00 | 1119.43 |
| Totals | | 124.45 | $5,909 | $1,927 | $0 | $0 | $7,836 |
| 1572500580 | Galv. steel rectangular duct, incl. ftngs., hangers, over 5,000 lb. | | | | | 10000.00 Lb. | |
| Unit values | | 0.08 | 0.36 | 1.30 | 0.00 | 0.00 | 1.66 |
| Totals | | 840.00 | $3,596 | $13,008 | $0 | $0 | $16,604 |
| 1574200001 | VAV CONTROL PAKAGE - DDC | | | | | 1.00 LOT | |
| Unit values | | 0.00 | 22500.00 | 5000.00 | 0.00 | 0.00 | 27500.00 |
| Totals | | 0.00 | $22,500 | $5,000 | $0 | $0 | $27,500 |
| 1574200002 | VARIABLE SPEED DRIVE 10 HP | | | | | 7.00 EA | |
| Unit values | | 0.00 | 1500.00 | 500.00 | 0.00 | 0.00 | 2000.00 |
| Totals | | 0.00 | $10,500 | $3,500 | $0 | $0 | $14,000 |

| Line # | Description | | | | | |
|---|---|---|---|---|---|---|
| | Manhours | Matl | Labor | Equipment | Sub | Total |
| U15 MECHANICAL | 2169 | $172,530 | $42,444 | $517 | $0 | $215,491 |
| 1681303700 | VAV BOXES 800 CFM | | | | | |
| | | | | | 60.00 EA | |
| Unit values | 0.00 | 1200.00 | 100.00 | 0.00 | 0.00 | 1300.00 |
| Totals | 0.00 | $72,000 | $6,000 | $0 | $0 | $78,000 |
| 1681303800 | ELEC THERMOSTAT LINE | | | | | |
| | | | | | 60.00 Ea. | |
| Unit values | 1.00 | 24.54 | 15.51 | 0.00 | 0.00 | 40.05 |
| Totals | 60.00 | $1,472 | $931 | $0 | $0 | $2,403 |
| U16 ELECTRICAL | 60 | $73,472 | $6,931 | $0 | $0 | $80,403 |

| Line # Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| ESTIMATE TOTAL | 2229 | $246,002 | $49,375 | $517 | $0 | $295,894 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $10,863 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $246,002 | $60,238 | $517 | $0 | $306,757 |
| CONTINGENCY | 15.00% | | | | | $46,013 |
| BOND | 3.00% | | | | | $9,203 |
| PROFIT | 10.00% | | | | | $30,676 |
| JOB TOTAL | | | | | | $392,648 |

Estimate: BLDG 1326 ECO-6 Date: 22-Dec-94
Description: HVAC RENOVATIONS
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U15 MECHANICAL | 2169 | $172,530 | $42,444 | $517 | $0 | $215,491 |
| U16 ELECTRICAL | 60 | $73,472 | $6,931 | $0 | $0 | $80,403 |
| TOTAL | 2229 | $246,002 | $49,375 | $517 | $0 | $295,894 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $10,863 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $246,002 | $60,238 | $517 | $0 | $306,757 |
| CONTINGENCY | 15.00% | | | | | $46,013 |
| BOND | 3.00% | | | | | $9,203 |
| PROFIT | 10.00% | | | | | $30,676 |
| JOB TOTAL | | | | | | $392,648 |

LIFE CYCLE COST ANALYSIS SUMMARY STUDY: ECO6
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 ECO 6 : HVAC RENOVATIONS
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 1-1333
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 70111. | | |
| B. SIOH | $ 3506. | | |
| C. DESIGN COST | $ 3506. | | |
| D. TOTAL COST (1A+1B+1C) | $ 77123. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 77123. |

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 | $ 34.95 | 46. | $ 1594. | 15.08 | $ 24033. |
| B. DIST | $ 19.18 | -10. | $ -195. | 18.57 | $ -3629. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | 0. | $ 0. | 18.58 | $ 0. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 35. | $ 1398. | | $ 20404. |

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

| | | |
|---|---|---|
| A. ANNUAL RECURRING (+/-) | | $ 1000. |
| (1) DISCOUNT FACTOR (TABLE A) | 14.88 | |
| (2) DISCOUNTED SAVING/COST (3A X 3A1) | | $ 14880. |

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

| ITEM | SAVINGS(+) COST(-) (1) | YR OC (2) | DISCNT FACTR (3) | DISCOUNTED SAVINGS(+)/ COST(-)(4) |
|---|---|---|---|---|
| 1. FUTURE RENOVATIONS | $ 70111. | 10 | .74 | 51882. |
| d. TOTAL | $ 70111. | | | 51882. |

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4) $ 66762.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) $ 5904.

5. SIMPLE PAYBACK PERIOD (1G/4) 13.06 YEAR

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) $ 87166.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 1.13
(IF < 1 PROJECT DOES NOT QUALIFY)
**** Project does not qualify for ECIP funding; 4,5,6 for information only.

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): N/A

| ENERGY TYPE<br>IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 79.52 | 891.42 |
| SPACE COOL | 347.65 | 0.00 |
| HVAC AUX | 192.92 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 303.25 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 324.51 | 0.00 |
| TOTAL | 1247.85 | 891.42 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 2139.24 MBTU | 162.3 KBTU/SQFT-YR GROSS-AREA | 162.3 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 4638.62 MBTU | 351.9 KBTU/SQFT-YR GROSS-AREA | 351.9 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 4.5

PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE<br>IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 85.91 | 926.20 |
| SPACE COOL | 265.92 | 0.00 |
| HVAC AUX | 112.64 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 303.25 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 324.51 | 0.00 |
| TOTAL | 1092.22 | 926.20 |

TOTAL SITE ENERGY 2018.41 MBTU 153.1 KBTU/SQFT-YR GROSS-AREA 153.1 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 4206.11 MBTU 319.1 KBTU/SQFT-YR GROSS-AREA 319.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 6.1
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| | | | | |
|---|---|---|---|---|
| Estimate: | BLDG 1333 ECO-6 | Date: | 22-Dec-94 | |
| Description: | HVAC RENOVATIONS | | | |
| Project: | ECIP / FEMP | Bid Date: | | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 | |
| Sq. footage: | | City indx: | Raleigh, NC | |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 1556513060 | HTGINSL DUK BLKT 1"FGLS 1.5#DENSE | | | | | 1000.00 S.F. | |
| Unit values | | 0.05 | 0.50 | 0.67 | 0.00 | 0.00 | 1.17 |
| Totals | | 46.00 | $500 | $672 | $0 | $0 | $1,172 |
| 1571806050 | ROOF TOP A/C SINGLE ZONE ELECTRIC COOL VAV 40 TON | | | | | 1.00 Ea. | |
| Unit values | | 200.00 | 32067.90 | 3267.00 | 0.00 | 0.00 | 35334.90 |
| Totals | | 200.00 | $32,068 | $3,267 | $0 | $0 | $35,335 |
| 1572500580 | Galv. steel rectangular duct, incl. ftngs., hangers, over 5,000 lb. | | | | | 2000.00 Lb. | |
| Unit values | | 0.08 | 0.36 | 1.30 | 0.00 | 0.00 | 1.66 |
| Totals | | 168.00 | $719 | $2,602 | $0 | $0 | $3,321 |
| 1574200001 | VAV CONTROL PAKAGE - DDC | | | | | 1.00 LOT | |
| Unit values | | 0.00 | 7500.00 | 2500.00 | 0.00 | 0.00 | 10000.00 |
| Totals | | 0.00 | $7,500 | $2,500 | $0 | $0 | $10,000 |
| 1574200003 | VARIABLE SPEED DRIVE 15 HP | | | | | 1.00 EA | |
| Unit values | | 0.00 | 2000.00 | 500.00 | 0.00 | 0.00 | 2500.00 |
| Totals | | 0.00 | $2,000 | $500 | $0 | $0 | $2,500 |
| U15 MECHANICAL | | 414 | $42,787 | $9,541 | $0 | $0 | $52,328 |

| Line # | Description | | | | | |
|---|---|---|---|---|---|---|
| | Manhours | Matl | Labor | Equipment | Sub | Total |
| 1681303800 | ELEC THERMOSTAT LINE | | | | 8.00 Ea. | |
| Unit values | 1.00 | 24.54 | 15.51 | 0.00 | 0.00 | 40.05 |
| Totals | 8.00 | $196 | $124 | $0 | $0 | $320 |
| U16 ELECTRICAL | 8 | $196 | $124 | $0 | $0 | $320 |

| Line # Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| ESTIMATE TOTAL | 422 | $42,983 | $9,665 | $0 | $0 | $52,648 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $2,126 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $42,983 | $11,791 | $0 | $0 | $54,774 |
| CONTINGENCY | 15.00% | | | | | $8,216 |
| BOND | 3.00% | | | | | $1,643 |
| PROFIT | 10.00% | | | | | $5,477 |
| JOB TOTAL | | | | | | $70,111 |

| | | | |
|---|---|---|---|
| Estimate: | BLDG 1333 ECO-6 | Date: | 22-Dec-94 |
| Description: | HVAC RENOVATIONS | | |
| Project: | ECIP / FEMP | Bid Date: | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 |
| Sq. footage: | | City indx: | Raleigh, NC |

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U15 MECHANICAL | 414 | $42,787 | $9,541 | $0 | $0 | $52,328 |
| U16 ELECTRICAL | 8 | $196 | $124 | $0 | $0 | $320 |
| TOTAL | 422 | $42,983 | $9,665 | $0 | $0 | $52,648 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $2,126 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $42,983 | $11,791 | $0 | $0 | $54,774 |
| CONTINGENCY | 15.00% | | | | | $8,216 |
| BOND | 3.00% | | | | | $1,643 |
| PROFIT | 10.00% | | | | | $5,477 |
| JOB TOTAL | | | | | | $70,111 |

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: ECO6
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 ECO 6 : HVAC RENOVATIONS
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1105
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 252148. | | |
| B. SIOH | $ 12607. | | |
| C. DESIGN COST | $ 12607. | | |
| D. TOTAL COST (1A+1B+1C) | $ 277362. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 277362. |

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 | $ 34.95 | -77. | $ -2691. | 15.08 | $ -40583. |
| B. DIST | $ 19.18 | 1044. | $ 20026. | 18.57 | $ 371880. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | 0. | $ 0. | 18.58 | $ 0. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 967. | $ 17335. | | $ 331297. |

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

A. ANNUAL RECURRING (+/-) — $ 1000.
(1) DISCOUNT FACTOR (TABLE A) — 14.88
(2) DISCOUNTED SAVING/COST (3A X 3A1) — $ 14880.

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

| ITEM | SAVINGS(+) COST(-) (1) | YR OC (2) | DISCNT FACTR (3) | DISCOUNTED SAVINGS(+)/ COST(-)(4) |
|---|---|---|---|---|
| 1. FUTURE RENOVATION | $ 252148. | 10 | .74 | 186590. |
| d. TOTAL | $ 252148. | | | 186590. |

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4) $ 201470.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) $ 30942.

5. SIMPLE PAYBACK PERIOD (1G/4) — 8.96 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) — $ 532767.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= — 1.92
(IF < 1 PROJECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): — 6.42 %

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 230.21 | 4552.14 |
| SPACE COOL | 1267.76 | 0.00 |
| HVAC AUX | 1808.60 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 3329.45 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 412.70 | 0.00 |
| TOTAL | 7048.73 | 4552.14 |

TOTAL SITE ENERGY 11601.09 MBTU 157.0 KBTU/SQFT-YR GROSS-AREA 157.0 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 25720.15 MBTU 348.0 KBTU/SQFT-YR GROSS-AREA 348.0 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 0.0
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 1.1

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE<br>IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 55.46 | 988.64 |
| SPACE COOL | 1966.33 | 0.00 |
| HVAC AUX | 1547.59 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 3329.46 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 412.70 | 0.00 |
| TOTAL | 7311.53 | 988.64 |

TOTAL SITE ENERGY 8300.24 MBTU 112.3 KBTU/SQFT-YR GROSS-AREA 112.3 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 22945.40 MBTU 310.5 KBTU/SQFT-YR GROSS-AREA 310.5 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 0.0
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 2.6

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| | | | |
|---|---|---|---|
| Estimate: | BLDG 1105 ECO-6 | Date: | 22-Dec-94 |
| Description: | HVAC RENOVATIONS | | |
| Project: | ECIP / FEMP | Bid Date: | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 |
| Sq. footage: | | City indx: | Raleigh, NC |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 1556513060 | HTGINSL DUK BLKT 1"FGLS 1.5#DENSE | | | | | 3000.00 S.F. | |
| Unit values | | 0.05 | 0.50 | 0.67 | 0.00 | 0.00 | 1.17 |
| Totals | | 138.00 | $1,499 | $2,015 | $0 | $0 | $3,514 |
| 1571251550 | CENTRAL STATION CHILLED WATER AHU 10,000 CFM MODULAR | | | | | 4.00 Ea. | |
| Unit values | | 44.44 | 4970.03 | 710.88 | 0.00 | 0.00 | 5680.90 |
| Totals | | 177.78 | $19,880 | $2,844 | $0 | $0 | $22,724 |
| 1571900630 | AC&V WTR CHL RECIP AIR COOL 125 TON | | | | | 1.00 Ea. | |
| Unit values | | 400.00 | 48951.00 | 6534.00 | 387.20 | 0.00 | 55872.20 |
| Totals | | 400.00 | $48,951 | $6,534 | $387 | $0 | $55,872 |
| 1572010390 | COIL WATER/CONDENSER 3/8" COP TUBE AL FIN 2ROWX8FIN 24" X 72" | | | | | 4.00 Ea. | |
| Unit values | | 12.03 | 689.31 | 184.53 | 0.00 | 0.00 | 873.84 |
| Totals | | 48.12 | $2,757 | $738 | $0 | $0 | $3,495 |
| 1572010430 | COIL WATER/CONDENSER 3/8" COP TUBE AL FIN 2ROWX8FIN 30" X 84" | | | | | 4.00 Ea. | |
| Unit values | | 17.78 | 844.16 | 275.28 | 0.00 | 0.00 | 1119.43 |
| Totals | | 71.11 | $3,377 | $1,101 | $0 | $0 | $4,478 |
| 1572500580 | Galv. steel rectangular duct, incl. ftngs., hangers, over 5,000 lb. | | | | | 5000.00 Lb. | |
| Unit values | | 0.08 | 0.36 | 1.30 | 0.00 | 0.00 | 1.66 |
| Totals | | 420.00 | $1,798 | $6,504 | $0 | $0 | $8,302 |
| 1574200001 | VAV CONTROL PAKAGE - DDC | | | | | 1.00 LOT | |
| Unit values | | 0.00 | 12500.00 | 2500.00 | 0.00 | 0.00 | 15000.00 |
| Totals | | 0.00 | $12,500 | $2,500 | $0 | $0 | $15,000 |
| 1574200003 | VARIABLE SPEED DRIVE 15 HP | | | | | 4.00 EA | |
| Unit values | | 0.00 | 2000.00 | 500.00 | 0.00 | 0.00 | 2500.00 |
| Totals | | 0.00 | $8,000 | $2,000 | $0 | $0 | $10,000 |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| U15 MECHANICAL | | 1255 | $98,762 | $24,236 | $387 | $0 | $123,385 |
| 1681303700 | VAV BOXES 800 CFM | | | | | 50.00 EA | |
| Unit values | | 0.00 | 1200.00 | 100.00 | 0.00 | 0.00 | 1300.00 |
| Totals | | 0.00 | $60,000 | $5,000 | $0 | $0 | $65,000 |
| 1681303800 | ELEC THERMOSTAT LINE | | | | | 50.00 Ea. | |
| Unit values | | 1.00 | 24.54 | 15.51 | 0.00 | 0.00 | 40.05 |
| Totals | | 50.00 | $1,227 | $776 | $0 | $0 | $2,003 |
| U16 ELECTRICAL | | 50 | $61,227 | $5,776 | $0 | $0 | $67,003 |

| Line # Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| ESTIMATE TOTAL | 1305 | $159,989 | $30,012 | $387 | $0 | $190,388 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $6,603 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $159,989 | $36,615 | $387 | $0 | $196,991 |
| CONTINGENCY | 15.00% | | | | | $29,549 |
| BOND | 3.00% | | | | | $5,910 |
| PROFIT | 10.00% | | | | | $19,699 |
| JOB TOTAL | | | | | | $252,148 |

Estimate: BLDG 1105 ECO-6 Date: 22-Dec-94
Description: HVAC RENOVATIONS
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U15 MECHANICAL | 1255 | $98,762 | $24,236 | $387 | $0 | $123,385 |
| U16 ELECTRICAL | 50 | $61,227 | $5,776 | $0 | $0 | $67,003 |
| TOTAL | 1305 | $159,989 | $30,012 | $387 | $0 | $190,388 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $6,603 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $159,989 | $36,615 | $387 | $0 | $196,991 |
| CONTINGENCY | 15.00% | | | | | $29,549 |
| BOND | 3.00% | | | | | $5,910 |
| PROFIT | 10.00% | | | | | $19,699 |
| JOB TOTAL | | | | | | $252,148 |

LIFE CYCLE COST ANALYSIS SUMMARY STUDY: ECO6
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 ECO 6 : HVAC RENOVATIONS
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1120
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 81909. | | |
| B. SIOH | $ 4095. | | |
| C. DESIGN COST | $ 4095. | | |
| D. TOTAL COST (1A+1B+1C) | $ 90099. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 90099. |

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 | $ 34.95 | 48. | $ 1671. | 15.08 | $ 25193. |
| B. DIST | $ 19.18 | 0. | $ 0. | 18.57 | $ 0. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | 0. | $ 0. | 18.58 | $ 0. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 48. | $ 1671. | | $ 25193. |

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

| | | |
|---|---|---|
| A. ANNUAL RECURRING (+/-) | | $ 1000. |
| (1) DISCOUNT FACTOR (TABLE A) | 14.88 | |
| (2) DISCOUNTED SAVING/COST (3A X 3A1) | | $ 14880. |

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

| ITEM | SAVINGS(+) COST(-) (1) | YR OC (2) | DISCNT FACTR (3) | DISCOUNTED SAVINGS(+)/ COST(-)(4) |
|---|---|---|---|---|
| 1. FUTURE RENOVATIONS | $ 81909. | 10 | .74 | 60613. |
| d. TOTAL | $ 81909. | | | 60613. |

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4) $ 75493.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) $ 6766.

5. SIMPLE PAYBACK PERIOD (1G/4) 13.32 YEAR

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) $ 100685.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 1.12
(IF < 1 PROJECT DOES NOT QUALIFY)
**** Project does not qualify for ECIP funding; 4,5,6 for information only.

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): N/A

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 181.42 | 4735.99 |
| SPACE COOL | 984.55 | 0.00 |
| HVAC AUX | 337.24 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1706.99 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 675.53 | 0.00 |
| TOTAL | 3885.73 | 4735.99 |

TOTAL SITE ENERGY 8621.56 MBTU 116.2 KBTU/SQFT-YR GROSS-AREA 116.2 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 16404.38 MBTU 221.1 KBTU/SQFT-YR GROSS-AREA 221.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.8
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 181.42 | 4735.99 |
| SPACE COOL | 821.39 | 0.00 |
| HVAC AUX | 337.24 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1706.99 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 675.53 | 0.00 |
| TOTAL | 3722.58 | 4735.99 |

TOTAL SITE ENERGY 8458.40 MBTU 114.0 KBTU/SQFT-YR GROSS-AREA 114.0 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 15914.41 MBTU 214.5 KBTU/SQFT-YR GROSS-AREA 214.5 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.8
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| | | | |
|---|---|---|---|
| Estimate: | BLDG 1120 ECO-6 | Date: | 22-Dec-94 |
| Description: | HVAC RENOVATIONS | | |
| Project: | ECIP / FEMP | Bid Date: | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 |
| Sq. footage: | | City indx: | Raleigh, NC |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 1517012110 | PIPE STEEL SCH 40 WELD JT ROLL HANGER FOR CVRG 10'OC BLK 4" DIAM | | | | | 50.00 L.F. | |
| Unit values | | 0.43 | 9.44 | 6.66 | 0.83 | 0.00 | 16.93 |
| Totals | | 21.60 | $472 | $333 | $42 | $0 | $847 |
| 1556515380 | PIPE CVR CALSIL W/CVR 1.5" WL 4" PIPE | | | | | 50.00 L.F. | |
| Unit values | | 0.13 | 3.05 | 1.88 | 0.00 | 0.00 | 4.92 |
| Totals | | 6.40 | $152 | $94 | $0 | $0 | $246 |
| 1571901210 | WATER CHILLER WATER COOLED RECIP SEMI-HERMETIC 160 TON | | | | | 1.00 Ea. | |
| Unit values | | 400.00 | 54445.50 | 6534.00 | 387.20 | 0.00 | 61366.70 |
| Totals | | 400.00 | $54,446 | $6,534 | $387 | $0 | $61,367 |
| U15 MECHANICAL | | 428 | $55,070 | $6,961 | $429 | $0 | $62,460 |

| Line # Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| ESTIMATE TOTAL | 428 | $55,070 | $6,961 | $429 | $0 | $62,460 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $1,531 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $55,070 | $8,492 | $429 | $0 | $63,991 |
| CONTINGENCY | 15.00% | | | | | $9,599 |
| BOND | 3.00% | | | | | $1,920 |
| PROFIT | 10.00% | | | | | $6,399 |
| JOB TOTAL | | | | | | $81,909 |

| | | | |
|---|---|---|---|
| Estimate: | BLDG 1120 ECO-6 | Date: | 22-Dec-94 |
| Description: | HVAC RENOVATIONS | | |
| Project: | ECIP / FEMP | Bid Date: | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 |
| Sq. footage: | | City indx: | Raleigh, NC |

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U15 MECHANICAL | 428 | $55,070 | $6,961 | $429 | $0 | $62,460 |
| TOTAL | 428 | $55,070 | $6,961 | $429 | $0 | $62,460 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $1,531 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $55,070 | $8,492 | $429 | $0 | $63,991 |
| CONTINGENCY | 15.00% | | | | | $9,599 |
| BOND | 3.00% | | | | | $1,920 |
| PROFIT | 10.00% | | | | | $6,399 |
| JOB TOTAL | | | | | | $81,909 |

LIFE CYCLE COST ANALYSIS SUMMARY STUDY: ECO6
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 ECO 6 : HVAC RENOVATIONS
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1127
ANALYSIS DATE: 03-16-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 61851. | | |
| B. SIOH | $ 3093. | | |
| C. DESIGN COST | $ 3093. | | |
| D. TOTAL COST (1A+1B+1C) | $ 68037. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 68037. |

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 | $ 34.95 | 79. | $ 2747. | 15.08 | $ 41431. |
| B. DIST | $ 19.18 | 0. | $ 0. | 18.57 | $ 0. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | 0. | $ 0. | 18.58 | $ 0. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 79. | $ 2747. | | $ 41431. |

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

| | | |
|---|---|---|
| A. ANNUAL RECURRING (+/-) | | $ 1000. |
| (1) DISCOUNT FACTOR (TABLE A) | 14.88 | |
| (2) DISCOUNTED SAVING/COST (3A X 3A1) | | $ 14880. |

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

| ITEM | SAVINGS(+) COST(-) (1) | YR OC (2) | DISCNT FACTR (3) | DISCOUNTED SAVINGS(+)/ COST(-)(4) |
|---|---|---|---|---|
| 1. FUTURE RENOVATION | $ 63154. | 10 | .74 | 46734. |
| d. TOTAL | $ 63154. | | | 46734. |

| | |
|---|---|
| C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4) | $ 61614. |
| 4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) | $ 6905. |
| 5. SIMPLE PAYBACK PERIOD (1G/4) | 9.85 YEARS |
| 6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) | $ 103045. |
| 7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= | 1.51 |

(IF < 1 PROJECT DOES NOT QUALIFY)
**** Project does not qualify for ECIP funding; 4,5,6 for information only.

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): N/A

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 178.99 | 3457.19 |
| SPACE COOL | 1433.37 | 0.00 |
| HVAC AUX | 1108.49 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1512.83 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 566.01 | 0.00 |
| TOTAL | 4799.69 | 3457.19 |

TOTAL SITE ENERGY 8256.87 MBTU 142.9 KBTU/SQFT-YR GROSS-AREA 142.9 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 17870.65 MBTU 309.2 KBTU/SQFT-YR GROSS-AREA 309.2 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 48.6
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 1.3

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 178.99 | 3457.19 |
| SPACE COOL | 1165.05 | 0.00 |
| HVAC AUX | 1108.49 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1512.83 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 566.01 | 0.00 |
| TOTAL | 4531.38 | 3457.19 |

TOTAL SITE ENERGY 7988.56 MBTU 138.2 KBTU/SQFT-YR GROSS-AREA 138.2 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 17064.89 MBTU 295.2 KBTU/SQFT-YR GROSS-AREA 295.2 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 48.6
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 1.3

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| | | | |
|---|---|---|---|
| Estimate: | BLDG 1127 ECO-6 | Date: | 16-Mar-95 |
| Description: | HVAC RENOVATIONS | | |
| Project: | ECIP / FEMP | Bid Date: | |
| Location: | FT BRAGG NC | Job #: | 94013.05 |
| Sq. footage: | | City indx: | Raleigh, NC |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 1517012110 | PIPE STEEL SCH 40 WELD JT ROLL HANGER FOR CVRG 10'OC BLK 4" DIAM | | | | | 50.00 L.F. | |
| Unit values | | 0.43 | 9.44 | 6.66 | 0.83 | 0.00 | 16.93 |
| Totals | | 21.60 | $472 | $333 | $42 | $0 | $847 |
| 1556515380 | PIPE CVR CALSIL W/CVR 1.5" WL 4" PIPE | | | | | 50.00 L.F. | |
| Unit values | | 0.13 | 3.05 | 1.88 | 0.00 | 0.00 | 4.92 |
| Totals | | 6.40 | $152 | $94 | $0 | $0 | $246 |
| 1571901170 | AC&V WTR CHLRS RECPRCTG WTR COOLED MULTIPLE COMPRS.SEMI-HERM.110 TON | | | | | 1.00 Ea. | |
| Unit values | | 290.00 | 41058.90 | 4749.25 | 281.33 | 0.00 | 46089.48 |
| Totals | | 290.00 | $41,059 | $4,749 | $281 | $0 | $46,089 |
| U15 MECHANICAL | | 318 | $41,683 | $5,176 | $323 | $0 | $47,182 |

| Line # Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| ESTIMATE TOTAL | 318 | $41,683 | $5,176 | $323 | $0 | $47,182 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $1,139 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $41,683 | $6,315 | $323 | $0 | $48,321 |
| CONTINGENCY | 15.00% | | | | | $7,248 |
| BOND | 3.00% | | | | | $1,450 |
| PROFIT | 10.00% | | | | | $4,832 |
| JOB TOTAL | | | | | | $61,851 |

Estimate: BLDG 1127 ECO-6 Date: 16-Mar-95
Description: HVAC RENOVATIONS
Project: ECIP / FEMP Bid Date:
Location: FT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U15 MECHANICAL | 318 | $41,683 | $5,176 | $323 | $0 | $47,182 |
| TOTAL | 318 | $41,683 | $5,176 | $323 | $0 | $47,182 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $1,139 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $41,683 | $6,315 | $323 | $0 | $48,321 |
| CONTINGENCY | 15.00% | | | | | $7,248 |
| BOND | 3.00% | | | | | $1,450 |
| PROFIT | 10.00% | | | | | $4,832 |
| JOB TOTAL | | | | | | $61,851 |

LIFE CYCLE COST ANALYSIS SUMMARY STUDY: ECO6
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 ECO 6 : HVAC RENOVATIONS
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1138
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 244506. | | |
| B. SIOH | $ 12225. | | |
| C. DESIGN COST | $ 12225. | | |
| D. TOTAL COST (1A+1B+1C) | $ 268956. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 268956. |

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 | $ 34.95 | 0. | $ 9. | 15.08 | $ 132. |
| B. DIST | $ 19.18 | 279. | $ 5359. | 18.57 | $ 99508. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | 0. | $ 0. | 18.58 | $ 0. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 280. | $ 5367. | | $ 99639. |

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

| | | |
|---|---|---|
| A. ANNUAL RECURRING (+/-) | | $ 1000. |
| (1) DISCOUNT FACTOR (TABLE A) | 14.88 | |
| (2) DISCOUNTED SAVING/COST (3A X 3A1) | | $ 14880. |

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

| ITEM | SAVINGS(+) COST(-) (1) | YR OC (2) | DISCNT FACTR (3) | DISCOUNTED SAVINGS(+)/ COST(-)(4) |
|---|---|---|---|---|
| 1. FUTURE RENOVATIONS | $ 244506. | 10 | .74 | 180934. |
| d. TOTAL | $ 244506. | | | 180934. |

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4) $ 195814.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) $ 18593.

5. SIMPLE PAYBACK PERIOD (1G/4) 14.47 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) $ 295454.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 1.10
(IF < 1 PROJECT DOES NOT QUALIFY)
**** Project does not qualify for ECIP funding; 4,5,6 for information only.

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): N/A

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 398.05 | 1053.81 |
| SPACE COOL | 344.03 | 0.00 |
| HVAC AUX | 373.27 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 466.41 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 325.45 | 0.00 |
| TOTAL | 1907.21 | 1053.81 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 2961.09 MBTU | 91.3 KBTU/SQFT-YR GROSS-AREA | 91.3 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 6781.38 MBTU | 209.1 KBTU/SQFT-YR GROSS-AREA | 209.1 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.1
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 40.62 | 873.22 |
| SPACE COOL | 489.12 | 0.00 |
| HVAC AUX | 399.71 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 664.40 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 669.36 | 0.00 |
| TOTAL | 2263.21 | 873.22 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 3136.42 MBTU | 165.3 KBTU/SQFT-YR GROSS-AREA | 165.3 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 7669.62 MBTU | 404.1 KBTU/SQFT-YR GROSS-AREA | 404.1 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 3.3
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 63.02 | 1901.29 |
| SPACE COOL | 324.06 | 0.00 |
| HVAC AUX | 453.90 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 664.37 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 669.34 | 0.00 |
| TOTAL | 2174.70 | 1901.29 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 4076.03 MBTU | 214.8 KBTU/SQFT-YR GROSS-AREA | 214.8 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 8432.04 MBTU | 444.3 KBTU/SQFT-YR GROSS-AREA | 444.3 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.6
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 380.28 | 1136.70 |
| SPACE COOL | 285.07 | 0.00 |
| HVAC AUX | 372.53 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 466.41 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 325.45 | 0.00 |
| TOTAL | 1829.75 | 1136.70 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 2966.52 MBTU | 91.5 KBTU/SQFT-YR GROSS-AREA | 91.5 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 6631.65 MBTU | 204.5 KBTU/SQFT-YR GROSS-AREA | 204.5 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 7.1
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 17.09 | 330.03 |
| SPACE COOL | 542.69 | 0.00 |
| HVAC AUX | 309.06 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 664.39 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 669.36 | 0.00 |
| TOTAL | 2202.59 | 330.03 |

TOTAL SITE ENERGY 2532.60 MBTU 133.4 KBTU/SQFT-YR GROSS-AREA 133.4 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 6944.35 MBTU 365.9 KBTU/SQFT-YR GROSS-AREA 365.9 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 4.3
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

FT BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 1/12/1995 11:10:53 PDL RUN 1
BUILDING 1-1138 ECO-6 PART C (THIRD FLOOR) HVAC RENOVATIONS
REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE WEATHER FILE- RALEIGH, NC

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 53.40 | 1408.07 |
| SPACE COOL | 454.70 | 0.00 |
| HVAC AUX | 471.78 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 664.38 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 669.35 | 0.00 |
| TOTAL | 2313.62 | 1408.07 |

TOTAL SITE ENERGY 3721.69 MBTU 196.1 KBTU/SQFT-YR GROSS-AREA 196.1 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 8355.89 MBTU 440.3 KBTU/SQFT-YR GROSS-AREA 440.3 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 2.5
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

Estimate: BLDG 1138 ECO-6 Date: 22-Dec-94
Description: HVAC RENOVATIONS
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 1556513060 | HTGINSL DUK BLKT 1"FGLS 1.5#DENSE | | | | | 3000.00 S.F. | |
| | Unit values | 0.05 | 0.50 | 0.67 | 0.00 | 0.00 | 1.17 |
| | Totals | 138.00 | $1,499 | $2,015 | $0 | $0 | $3,514 |
| 1571251550 | CENTRAL STATION CHILLED WATER AHU 10,000 CFM MODULAR | | | | | 4.00 Ea. | |
| | Unit values | 44.44 | 4970.03 | 710.88 | 0.00 | 0.00 | 5680.90 |
| | Totals | 177.78 | $19,880 | $2,844 | $0 | $0 | $22,724 |
| 1571900600 | AC&V WTR CHL RECPG AIR COOL 100 TON | | | | | 1.00 Ea. | |
| | Unit values | 320.00 | 44955.00 | 5233.25 | 0.00 | 0.00 | 50188.25 |
| | Totals | 320.00 | $44,955 | $5,233 | $0 | $0 | $50,188 |
| 1572010390 | COIL WATER/CONDENSER 3/8" COP TUBE AL FIN 2ROWX8FIN 24" X 72" | | | | | 4.00 Ea. | |
| | Unit values | 12.03 | 689.31 | 184.53 | 0.00 | 0.00 | 873.84 |
| | Totals | 48.12 | $2,757 | $738 | $0 | $0 | $3,495 |
| 1572010430 | COIL WATER/CONDENSER 3/8" COP TUBE AL FIN 2ROWX8FIN 30" X 84" | | | | | 4.00 Ea. | |
| | Unit values | 17.78 | 844.16 | 275.28 | 0.00 | 0.00 | 1119.43 |
| | Totals | 71.11 | $3,377 | $1,101 | $0 | $0 | $4,478 |
| 1572500580 | Galv. steel rectangular duct, incl. ftngs., hangers, over 5,000 lb. | | | | | 5000.00 Lb. | |
| | Unit values | 0.08 | 0.36 | 1.30 | 0.00 | 0.00 | 1.66 |
| | Totals | 420.00 | $1,798 | $6,504 | $0 | $0 | $8,302 |
| 1574200001 | VAV CONTROL PAKAGE - DDC | | | | | 1.00 LOT | |
| | Unit values | 0.00 | 12500.00 | 2500.00 | 0.00 | 0.00 | 15000.00 |
| | Totals | 0.00 | $12,500 | $2,500 | $0 | $0 | $15,000 |
| 1574200003 | VARIABLE SPEED DRIVE 15 HP | | | | | 4.00 EA | |
| | Unit values | 0.00 | 2000.00 | 500.00 | 0.00 | 0.00 | 2500.00 |
| | Totals | 0.00 | $8,000 | $2,000 | $0 | $0 | $10,000 |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| U15 MECHANICAL | | 1175 | $94,766 | $22,935 | $0 | $0 | $117,701 |
| 1681303700 | VAV BOXES 800 CFM | | | | | 50.00 EA | |
| Unit values | | 0.00 | 1200.00 | 100.00 | 0.00 | 0.00 | 1300.00 |
| Totals | | 0.00 | $60,000 | $5,000 | $0 | $0 | $65,000 |
| 1681303800 | ELEC THERMOSTAT LINE | | | | | 50.00 Ea. | |
| Unit values | | 1.00 | 24.54 | 15.51 | 0.00 | 0.00 | 40.05 |
| Totals | | 50.00 | $1,227 | $776 | $0 | $0 | $2,003 |
| U16 ELECTRICAL | | 50 | $61,227 | $5,776 | $0 | $0 | $67,003 |

| Line # Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| ESTIMATE TOTAL | 1225 | $155,993 | $28,711 | $0 | $0 | $184,704 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $6,316 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $155,993 | $35,027 | $0 | $0 | $191,020 |
| CONTINGENCY | 15.00% | | | | | $28,653 |
| BOND | 3.00% | | | | | $5,731 |
| PROFIT | 10.00% | | | | | $19,102 |
| JOB TOTAL | | | | | | $244,506 |

| | | | | |
|---|---|---|---|---|
| Estimate: | BLDG 1138 ECO-6 | Date: | 22-Dec-94 | |
| Description: | HVAC RENOVATIONS | | | |
| Project: | ECIP / FEMP | Bid Date: | | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 | |
| Sq. footage: | | City indx: | Raleigh, NC | |

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U15 MECHANICAL | 1175 | $94,766 | $22,935 | $0 | $0 | $117,701 |
| U16 ELECTRICAL | 50 | $61,227 | $5,776 | $0 | $0 | $67,003 |
| TOTAL | 1225 | $155,993 | $28,711 | $0 | $0 | $184,704 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $6,316 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $155,993 | $35,027 | $0 | $0 | $191,020 |
| CONTINGENCY | 15.00% | | | | | $28,653 |
| BOND | 3.00% | | | | | $5,731 |
| PROFIT | 10.00% | | | | | $19,102 |
| JOB TOTAL | | | | | | $244,506 |

LIFE CYCLE COST ANALYSIS SUMMARY STUDY: ECO6
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 ECO 6 : HVAC RENOVATIONS
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1549
ANALYSIS DATE: 01-16-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 28118. | | |
| B. SIOH | $ 1406. | | |
| C. DESIGN COST | $ 1406. | | |
| D. TOTAL COST (1A+1B+1C) | $ 30930. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | $ 0. | | |
| F. PUBLIC UTILITY COMPANY REBATE | $ 0. | | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | $ | 30930. |

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 | $ 34.95 | 10. | $ 350. | 15.08 | $ 5270. |
| B. DIST | $ 19.18 | 2. | $ 38. | 18.57 | $ 712. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | 0. | $ 0. | 18.58 | $ 0. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 12. | $ 388. | | $ 5983. |

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

| | | |
|---|---|---|
| A. ANNUAL RECURRING (+/-) | | $ 0. |
| (1) DISCOUNT FACTOR (TABLE A) | 14.88 | |
| (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) |
|---|---|---|---|---|
| 1. FUTURE RENOVATIONS | $ 28110. | 10 | .74 | 20801. |
| d. TOTAL | $ 28110. | | | 20801. |

| | | |
|---|---|---|
| C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4) | $ | 20801. |
| 4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) | $ | 1793. |
| 5. SIMPLE PAYBACK PERIOD (1G/4) | | 17.25 YEARS |
| 6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) | $ | 26784. |
| 7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= | | .87 |

(IF < 1 PROJECT DOES NOT QUALIFY)
**** Project does not qualify for ECIP funding; 4,5,6 for information only.

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): N/A

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 102.49 | 3805.53 |
| SPACE COOL | 0.00 | 0.00 |
| HVAC AUX | 52.17 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 661.50 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 94.60 | 0.00 |
| TOTAL | 910.77 | 3805.53 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 4716.32 MBTU | 205.1 KBTU/SQFT-YR GROSS-AREA | 205.1 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 6540.62 MBTU | 284.4 KBTU/SQFT-YR GROSS-AREA | 284.4 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 43.5
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE<br>IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 192.37 | 3803.76 |
| SPACE COOL | 0.00 | 0.00 |
| HVAC AUX | 52.17 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 661.50 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 94.60 | 0.00 |
| TOTAL | 900.65 | 3803.76 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 4716.32 MBTU | 205.1 KBTU/SQFT-YR GROSS-AREA | 205.1 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 6540.62 MBTU | 284.4 KBTU/SQFT-YR GROSS-AREA | 284.4 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 43.5
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

Estimate: BLDG 1549 ECO6 Date: 03-Jan-95
Description: HVAC RENOVATION
Project: LIMITED EEAP(RDBRKBid Date:
Location: FORT BRAGG, N.C. Job #: 94013.05
Sq. footage: 30000 City indx:Raleigh, NC

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 0913100280 | ROOFTOP HVAC POWER FEEDER INSTALLATION, INCLUDING CONDUIT AND WIRE, 200 AMPERES | | | | | 450.00 L.F. | |
| | Unit values | 0.31 | 9.45 | 6.71 | 0.00 | 0.00 | 16.16 |
| | Totals | 137.70 | $4,250 | $3,020 | $0 | $0 | $7,270 |
| A09 ELECTRICAL | | 138 | $4,250 | $3,020 | $0 | $0 | $7,270 |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 1571801120 | ROOFTOP HVAC, SINGLE ZONE, 4 TON COOL, 95 MBH GAS HEAT | | | | | 1.00 Ea. | |
| | Unit values | 14.55 | 3821.18 | 223.85 | 0.00 | 0.00 | 4045.03 |
| | Totals | 14.55 | $3,821 | $224 | $0 | $0 | $4,045 |
| 1571801140 | ROOFTOP HVAC, SINGLE ZONE, 5 TON COOL, 112 MBH GAS HEAT | | | | | 1.00 Ea. | |
| | Unit values | 28.57 | 3946.05 | 441.65 | 0.00 | 0.00 | 4387.70 |
| | Totals | 28.57 | $3,946 | $442 | $0 | $0 | $4,388 |
| 1572500560 | AC&V DUCTWORK GALV STL 1000 TO 2000 LB | | | | | 1900.00 Lb. | |
| | Unit values | 0.09 | 0.46 | 1.40 | 0.00 | 0.00 | 1.86 |
| | Totals | 172.90 | $873 | $2,655 | $0 | $0 | $3,528 |
| 1572501560 | AC&V FLX DCT COATED FIBERGLASS FABRIC ON METAL HELIX NO INSUL 6" DIA | | | | | 100.00 L.F. | |
| | Unit values | 0.06 | 1.03 | 0.85 | 0.00 | 0.00 | 1.88 |
| | Totals | 5.70 | $103 | $85 | $0 | $0 | $188 |
| 1574205220 | ELECTRIC THERMOSTAT WITH COVER AND WIRING | | | | | 6.00 Ea. | |
| | Unit values | 1.00 | 74.93 | 20.81 | 0.00 | 0.00 | 95.74 |
| | Totals | 6.00 | $450 | $125 | $0 | $0 | $575 |
| 1574502020 | AC&V DIFFUSRS AL TBAR24X24LAYIN 9X9 | | | | | 12.00 Ea. | |
| | Unit values | 0.57 | 58.44 | 9.47 | 0.00 | 0.00 | 67.91 |
| | Totals | 6.85 | $701 | $114 | $0 | $0 | $815 |
| 1574601040 | AC&V GRILLES AIR RETURNS 14"X6" | | | | | 6.00 Ea. | |
| | Unit values | 0.35 | 11.19 | 5.75 | 0.00 | 0.00 | 16.94 |
| | Totals | 2.09 | $67 | $34 | $0 | $0 | $101 |
| U15 MECHANICAL | | 237 | $9,961 | $3,679 | $0 | $0 | $13,640 |

| Line # | Description | | | | | |
|---|---|---|---|---|---|---|
| | Manhours | Matl | Labor | Equipment | Sub | Total |
| 1633600400 | SAFETY SW FU GEN DUTY 240V 3P 200A FOR ROOFTOP HVAC UNITS | | | | 2.00 Ea. | |
| Unit values | 6.15 | 263.91 | 95.32 | 0.00 | 0.00 | 359.23 |
| Totals | 12.31 | $528 | $191 | $0 | $0 | $719 |
| U16 ELECTRICAL | 13 | $528 | $191 | $0 | $0 | $719 |

| Line # | Description | | | | | |
|---|---|---|---|---|---|---|
| | Manhours | Matl | Labor | Equipment | Sub | Total |
| ESTIMATE TOTAL | 388 | $14,739 | $6,890 | $0 | $0 | $21,629 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 0.00% | | $0 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 0.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $14,739 | $6,890 | $0 | $0 | $21,629 |
| CONTINGENCY | 20.00% | | | | | $4,326 |
| BOND | 0.00% | | | | | $0 |
| PROFIT | 10.00% | | | | | $2,163 |
| JOB TOTAL | | | | | | $28,118 |

Estimate: BLDG 1549 ECO6 Date: 03-Jan-95
Description: HVAC RENOVATION
Project: LIMITED EEAP(RDBRKBid Date:
Location: FORT BRAGG, N.C. Job #: 94013.05
Sq. footage: 30000 City indx:Raleigh, NC

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| A09 ELECTRICAL | 138 | $4,250 | $3,020 | $0 | $0 | $7,270 |
| U15 MECHANICAL | 237 | $9,961 | $3,679 | $0 | $0 | $13,640 |
| U16 ELECTRICAL | 13 | $528 | $191 | $0 | $0 | $719 |
| TOTAL | 388 | $14,739 | $6,890 | $0 | $0 | $21,629 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 0.00% | | $0 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 0.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $14,739 | $6,890 | $0 | $0 | $21,629 |
| CONTINGENCY | 20.00% | | | | | $4,326 |
| BOND | 0.00% | | | | | $0 |
| PROFIT | 10.00% | | | | | $2,163 |
| JOB TOTAL | | | | | | $28,118 |

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: ECO6
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 ECO 6 : HVAC RENOVATIONS
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1728
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 244506. | | |
| B. SIOH | $ 12225. | | |
| C. DESIGN COST | $ 12225. | | |
| D. TOTAL COST (1A+1B+1C) | $ 268956. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 268956. |

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 | $ 34.95 | 62. | $ 2152. | 15.08 | $ 32455. |
| B. DIST | $ 19.18 | 692. | $ 13275. | 18.57 | $ 246521. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | 0. | $ 0. | 18.58 | $ 0. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 754. | $ 15427. | | $ 278977. |

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

| | | |
|---|---|---|
| A. ANNUAL RECURRING (+/-) | | $ 1000. |
| (1) DISCOUNT FACTOR (TABLE A) | 14.88 | |
| (2) DISCOUNTED SAVING/COST (3A X 3A1) | | $ 14880. |

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

| ITEM | SAVINGS(+) COST(-) (1) | YR OC (2) | DISCNT FACTR (3) | DISCOUNTED SAVINGS(+)/ COST(-)(4) |
|---|---|---|---|---|
| 1. FUTURE RENOVATIONS | $ 244506. | 10 | .74 | 180934. |
| d. TOTAL | $ 244506. | | | 180934. |

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4) $ 195814.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) $ 28653.

5. SIMPLE PAYBACK PERIOD (1G/4) 9.39 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) $ 474791.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 1.77
(IF < 1 PROJECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): 5.97 %

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 133.98 | 3035.71 |
| SPACE COOL | 1096.12 | 0.00 |
| HVAC AUX | 1466.37 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1672.31 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 994.36 | 0.00 |
| TOTAL | 5363.14 | 3035.71 |

TOTAL SITE ENERGY 8398.77 MBTU 112.3 KBTU/SQFT-YR GROSS-AREA 112.3 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 19140.97 MBTU 255.8 KBTU/SQFT-YR GROSS-AREA 255.8 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 2.4
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 34.87 | 673.43 |
| SPACE COOL | 1335.50 | 0.00 |
| HVAC AUX | 1115.96 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1672.30 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 994.36 | 0.00 |
| TOTAL | 5152.98 | 673.43 |

TOTAL SITE ENERGY 5826.29 MBTU 77.9 KBTU/SQFT-YR GROSS-AREA 77.9 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 16147.48 MBTU 215.8 KBTU/SQFT-YR GROSS-AREA 215.8 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 2.0
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| | | | | |
|---|---|---|---|---|
| Estimate: | BLDG 1728 ECO-6 | Date: | 22-Dec-94 | |
| Description: | HVAC RENOVATIONS | | | |
| Project: | ECIP / FEMP | Bid Date: | | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 | |
| Sq. footage: | | City indx: | Raleigh, NC | |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 1556513060 | HTGINSL DUK BLKT 1"FGLS 1.5#DENSE | | | | | 3000.00 S.F. | |
| Unit values | | 0.05 | 0.50 | 0.67 | 0.00 | 0.00 | 1.17 |
| Totals | | 138.00 | $1,499 | $2,015 | $0 | $0 | $3,514 |
| 1571251550 | CENTRAL STATION CHILLED WATER AHU 10,000 CFM MODULAR | | | | | 4.00 Ea. | |
| Unit values | | 44.44 | 4970.03 | 710.88 | 0.00 | 0.00 | 5680.90 |
| Totals | | 177.78 | $19,880 | $2,844 | $0 | $0 | $22,724 |
| 1571900600 | AC&V WTR CHL RECPG AIR COOL 100 TON | | | | | 1.00 Ea. | |
| Unit values | | 320.00 | 44955.00 | 5233.25 | 0.00 | 0.00 | 50188.25 |
| Totals | | 320.00 | $44,955 | $5,233 | $0 | $0 | $50,188 |
| 1572010390 | COIL WATER/CONDENSER 3/8" COP TUBE AL FIN 2ROWX8FIN 24" X 72" | | | | | 4.00 Ea. | |
| Unit values | | 12.03 | 689.31 | 184.53 | 0.00 | 0.00 | 873.84 |
| Totals | | 48.12 | $2,757 | $738 | $0 | $0 | $3,495 |
| 1572010430 | COIL WATER/CONDENSER 3/8" COP TUBE AL FIN 2ROWX8FIN 30" X 84" | | | | | 4.00 Ea. | |
| Unit values | | 17.78 | 844.16 | 275.28 | 0.00 | 0.00 | 1119.43 |
| Totals | | 71.11 | $3,377 | $1,101 | $0 | $0 | $4,478 |
| 1572500580 | Galv. steel rectangular duct, incl. ftngs., hangers, over 5,000 lb. | | | | | 5000.00 Lb. | |
| Unit values | | 0.08 | 0.36 | 1.30 | 0.00 | 0.00 | 1.66 |
| Totals | | 420.00 | $1,798 | $6,504 | $0 | $0 | $8,302 |
| 1574200001 | VAV CONTROL PAKAGE - DDC | | | | | 1.00 LOT | |
| Unit values | | 0.00 | 12500.00 | 2500.00 | 0.00 | 0.00 | 15000.00 |
| Totals | | 0.00 | $12,500 | $2,500 | $0 | $0 | $15,000 |
| 1574200003 | VARIABLE SPEED DRIVE 15 HP | | | | | 4.00 EA | |
| Unit values | | 0.00 | 2000.00 | 500.00 | 0.00 | 0.00 | 2500.00 |
| Totals | | 0.00 | $8,000 | $2,000 | $0 | $0 | $10,000 |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| U15 MECHANICAL | | 1175 | $94,766 | $22,935 | $0 | $0 | $117,701 |
| 1681303700 | VAV BOXES 800 CFM | | | | | 50.00 EA | |
| Unit values | | 0.00 | 1200.00 | 100.00 | 0.00 | 0.00 | 1300.00 |
| Totals | | 0.00 | $60,000 | $5,000 | $0 | $0 | $65,000 |
| 1681303800 | ELEC THERMOSTAT LINE | | | | | 50.00 Ea. | |
| Unit values | | 1.00 | 24.54 | 15.51 | 0.00 | 0.00 | 40.05 |
| Totals | | 50.00 | $1,227 | $776 | $0 | $0 | $2,003 |
| U16 ELECTRICAL | | 50 | $61,227 | $5,776 | $0 | $0 | $67,003 |

| Line # | Description | | | | | |
|---|---|---|---|---|---|---|
| | Manhours | Matl | Labor | Equipment | Sub | Total |
| ESTIMATE TOTAL | 1225 | $155,993 | $28,711 | $0 | $0 | $184,704 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $6,316 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $155,993 | $35,027 | $0 | $0 | $191,020 |
| CONTINGENCY | 15.00% | | | | | $28,653 |
| BOND | 3.00% | | | | | $5,731 |
| PROFIT | 10.00% | | | | | $19,102 |
| JOB TOTAL | | | | | | $244,506 |

| | | | |
|---|---|---|---|
| Estimate: | BLDG 1728 ECO-6 | Date: | 22-Dec-94 |
| Description: | HVAC RENOVATIONS | | |
| Project: | ECIP / FEMP | Bid Date: | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 |
| Sq. footage: | | City indx: | Raleigh, NC |

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U15 MECHANICAL | 1175 | $94,766 | $22,935 | $0 | $0 | $117,701 |
| U16 ELECTRICAL | 50 | $61,227 | $5,776 | $0 | $0 | $67,003 |
| TOTAL | 1225 | $155,993 | $28,711 | $0 | $0 | $184,704 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $6,316 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $155,993 | $35,027 | $0 | $0 | $191,020 |
| CONTINGENCY | 15.00% | | | | | $28,653 |
| BOND | 3.00% | | | | | $5,731 |
| PROFIT | 10.00% | | | | | $19,102 |
| JOB TOTAL | | | | | | $244,506 |

LIFE CYCLE COST ANALYSIS SUMMARY STUDY: ECO6
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 ECO 6 : HVAC RENOVATIONS
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1731
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 71002. | | |
| B. SIOH | $ 3550. | | |
| C. DESIGN COST | $ 3550. | | |
| D. TOTAL COST (1A+1B+1C) | $ 78102. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | | $ 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | | $ 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 78102. |

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 | $ 34.95 | 25. | $ 880. | 15.08 | $ 13266. |
| B. DIST | $ 19.18 | 13. | $ 240. | 18.57 | $ 4459. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | 0. | $ 0. | 18.58 | $ 0. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 38. | $ 1120. | | $ 17725. |

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

| | | |
|---|---|---|
| A. ANNUAL RECURRING (+/-) | | $ 1000. |
| (1) DISCOUNT FACTOR (TABLE A) | 14.88 | |
| (2) DISCOUNTED SAVING/COST (3A X 3A1) | | $ 14880. |

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

| ITEM | SAVINGS(+) COST(-) (1) | YR OC (2) | DISCNT FACTR (3) | DISCOUNTED SAVINGS(+)/ COST(-)(4) |
|---|---|---|---|---|
| 1. FUTURE RENOVATIONS | $ 71002. | 10 | .74 | 52541. |
| d. TOTAL | $ 71002. | | | 52541. |

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4) $ 67421.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) $ 5670.

5. SIMPLE PAYBACK PERIOD (1G/4) 13.77 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) $ 85147.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 1.09
(IF < 1 PROJECT DOES NOT QUALIFY)
**** Project does not qualify for ECIP funding; 4,5,6 for information only.

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): N/A

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 40.00 | 764.80 |
| SPACE COOL | 597.47 | 0.00 |
| HVAC AUX | 159.66 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 737.12 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 430.90 | 0.00 |
| TOTAL | 1965.15 | 764.80 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 2729.95 MBTU | 123.9 KBTU/SQFT-YR GROSS-AREA | 123.9 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 6666.15 MBTU | 302.5 KBTU/SQFT-YR GROSS-AREA | 302.5 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 9.7
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 31.12 | 601.04 |
| SPACE COOL | 598.57 | 0.00 |
| HVAC AUX | 399.31 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 569.71 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 312.40 | 0.00 |
| TOTAL | 1911.12 | 601.04 |

TOTAL SITE ENERGY 2512.19 MBTU 109.8 KBTU/SQFT-YR GROSS-AREA 109.8 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 6340.23 MBTU 277.0 KBTU/SQFT-YR GROSS-AREA 277.0 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.4
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 32.17 | 621.20 |
| SPACE COOL | 601.67 | 0.00 |
| HVAC AUX | 402.21 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 569.72 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 306.02 | 0.00 |
| TOTAL | 1911.79 | 621.20 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 2532.99 MBTU | 110.7 KBTU/SQFT-YR GROSS-AREA | 110.7 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 6362.32 MBTU | 278.0 KBTU/SQFT-YR GROSS-AREA | 278.0 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.3
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 40.00 | 764.80 |
| SPACE COOL | 567.25 | 0.00 |
| HVAC AUX | 159.66 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 737.12 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 430.90 | 0.00 |
| TOTAL | 1934.92 | 764.80 |

TOTAL SITE ENERGY 2699.73 MBTU 122.5 KBTU/SQFT-YR GROSS-AREA 122.5 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 6575.40 MBTU 298.3 KBTU/SQFT-YR GROSS-AREA 298.3 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 9.7
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE<br>IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 31.12 | 601.04 |
| SPACE COOL | 566.28 | 0.00 |
| HVAC AUX | 399.31 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 569.71 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 312.41 | 0.00 |
| TOTAL | 1878.83 | 601.04 |

TOTAL SITE ENERGY 2479.90 MBTU 108.4 KBTU/SQFT-YR GROSS-AREA 108.4 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 6243.28 MBTU 272.8 KBTU/SQFT-YR GROSS-AREA 272.8 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.4
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE<br>IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 29.95 | 578.47 |
| SPACE COOL | 569.10 | 0.00 |
| HVAC AUX | 413.62 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 569.72 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 306.02 | 0.00 |
| TOTAL | 1888.41 | 578.47 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 2466.89 MBTU | 107.8 KBTU/SQFT-YR GROSS-AREA | 107.8 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 6249.40 MBTU | 273.1 KBTU/SQFT-YR GROSS-AREA | 273.1 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.3
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| | | | |
|---|---|---|---|
| Estimate: | BLDG 1731 ECO-6 | Date: | 22-Dec-94 |
| Description: | HVAC RENOVATIONS | | |
| Project: | ECIP / FEMP | Bid Date: | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 |
| Sq. footage: | | City indx: | Raleigh, NC |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 1517012110 | PIPE STEEL SCH 40 WELD JT ROLL HANGER FOR CVRG 10'OC BLK 4" DIAM | | | | | 50.00 L.F. | |
| Unit values | | 0.43 | 9.44 | 6.66 | 0.83 | 0.00 | 16.93 |
| Totals | | 21.60 | $472 | $333 | $42 | $0 | $847 |
| 1556515380 | PIPE CVR CALSIL W/CVR 1.5" WL 4" PIPE | | | | | 50.00 L.F. | |
| Unit values | | 0.13 | 3.05 | 1.88 | 0.00 | 0.00 | 4.92 |
| Totals | | 6.40 | $152 | $94 | $0 | $0 | $246 |
| 1571901200 | AC&V WTR CHLRS RECPRCTG WTR COOLED MULTIPLE COMPRS.SEMI-HERM.140 TON | | | | | 1.00 Ea. | |
| Unit values | | 355.00 | 46853.10 | 5808.00 | 344.85 | 0.00 | 53005.95 |
| Totals | | 355.00 | $46,853 | $5,808 | $345 | $0 | $53,006 |
| U15 MECHANICAL | | 383 | $47,477 | $6,235 | $387 | $0 | $54,099 |

| Line # Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| ESTIMATE TOTAL | 383 | $47,477 | $6,235 | $387 | $0 | $54,099 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $1,372 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $47,477 | $7,607 | $387 | $0 | $55,471 |
| CONTINGENCY | 15.00% | | | | | $8,321 |
| BOND | 3.00% | | | | | $1,664 |
| PROFIT | 10.00% | | | | | $5,547 |
| JOB TOTAL | | | | | | $71,002 |

| | | | |
|---|---|---|---|
| Estimate: | BLDG 1731 ECO-6 | Date: | 22-Dec-94 |
| Description: | HVAC RENOVATIONS | | |
| Project: | ECIP / FEMP | Bid Date: | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 |
| Sq. footage: | | City indx: | Raleigh, NC |

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U15 MECHANICAL | 383 | $47,477 | $6,235 | $387 | $0 | $54,099 |
| TOTAL | 383 | $47,477 | $6,235 | $387 | $0 | $54,099 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $1,372 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $47,477 | $7,607 | $387 | $0 | $55,471 |
| CONTINGENCY | 15.00% | | | | | $8,321 |
| BOND | 3.00% | | | | | $1,664 |
| PROFIT | 10.00% | | | | | $5,547 |
| JOB TOTAL | | | | | | $71,002 |

This section contains the life-cycle cost analyses, energy calculations, and cost estimates for ECO-7: Install Central Chilled Water Plant. The energy savings from each building proposed to be connected to the central plant was combined to form one total energy savings figure.

A single life-cycle cost analysis and cost estimate was performed for this ECO.

# TABLE OF CONTENTS

# LIFE - CYCLE COST ANALYSIS SUMMARY

LIFE CYCLE COST ANALYSIS SUMMARY — STUDY: ECO7
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) — LCCID FY95 (92)
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 94013.05 EOC 7 : CENTRAL CHILLED WATER PLANT
FISCAL YEAR 95 DISCRETE PORTION NAME: CENTRAL CHILL WATER
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

| | | | |
|---|---|---|---|
| A. CONSTRUCTION COST | $ 1290693. | | |
| B. SIOH | $ 64535. | | |
| C. DESIGN COST | $ 64535. | | |
| D. TOTAL COST (1A+1B+1C) | $ 1419763. | | |
| E. SALVAGE VALUE OF EXISTING EQUIPMENT | $ | 0. | |
| F. PUBLIC UTILITY COMPANY REBATE | $ | 0. | |
| G. TOTAL INVESTMENT (1D - 1E - 1F) | | | $ 1419763. |

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

| FUEL | UNIT COST $/ MWH(1) | SAVINGS MWH/YR(2) | ANNUAL $ SAVINGS(3) | DISCOUNT FACTOR(4) | DISCOUNTED SAVINGS(5) |
|---|---|---|---|---|---|
| A. ELECT | $ 34.95 | 724. | $ 25293. | 15.08 | $ 381418. |
| B. DIST | $ .00 | 0. | $ 0. | 18.57 | $ 0. |
| C. RESID | $ .00 | 0. | $ 0. | 21.02 | $ 0. |
| D. NAT G | $ 13.45 | 0. | $ 0. | 18.58 | $ 0. |
| E. COAL | $ .00 | 0. | $ 0. | 16.83 | $ 0. |
| F. PPG | $ .00 | 0. | $ 0. | 17.38 | $ 0. |
| M. DEMAND SAVINGS | | | $ 0. | 14.88 | $ 0. |
| N. TOTAL | | 724. | $ 25293. | | $ 381418. |

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

A. ANNUAL RECURRING (+/-) $ 9000.
(1) DISCOUNT FACTOR (TABLE A) 14.88
(2) DISCOUNTED SAVING/COST (3A X 3A1) $ 133920.

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

| ITEM | SAVINGS(+) COST(-) (1) | YR OC (2) | DISCNT FACTR (3) | DISCOUNTED SAVINGS(+)/ COST(-)(4) |
|---|---|---|---|---|
| 1. CHILLER REPLACEMENT | $ 225000. | 10 | .74 | 166500. |
| d. TOTAL | $ 225000. | | | 166500. |

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4) $ 300420.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) $ 45543.

5. SIMPLE PAYBACK PERIOD (1G/4) 31.17 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) $ 681838.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= .48
(IF < 1 PROJECT DOES NOT QUALIFY)
**** Project does not qualify for ECIP funding; 4,5,6 for information only.

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): N/A

# BUILDING CALCULATIONS

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 68.66 | 1328.59 |
| SPACE COOL | 310.70 | 0.00 |
| HVAC AUX | 369.70 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 622.17 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 242.60 | 0.00 |
| TOTAL | 1613.84 | 1328.59 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 3048.69 MBTU | 158.5 KBTU/SQFT-YR GROSS-AREA | 158.5 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 6494.06 MBTU | 337.5 KBTU/SQFT-YR GROSS-AREA | 337.5 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.0
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 68.66 | 1328.59 |
| SPACE COOL | 274.67 | 0.00 |
| HVAC AUX | 369.70 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 622.17 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 242.60 | 0.00 |
| TOTAL | 1577.81 | 1328.59 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 3012.67 MBTU | 156.6 KBTU/SQFT-YR GROSS-AREA | 156.6 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 6385.87 MBTU | 331.9 KBTU/SQFT-YR GROSS-AREA | 331.9 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.0
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 285.53 | 5085.34 |
| SPACE COOL | 1748.59 | 0.00 |
| HVAC AUX | 1223.96 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1903.50 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 1087.17 | 0.00 |
| TOTAL | 6248.75 | 5085.34 |

TOTAL SITE ENERGY 11333.96 MBTU 192.0 KBTU/SQFT-YR GROSS-AREA 192.0 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 23849.96 MBTU 404.0 KBTU/SQFT-YR GROSS-AREA 404.0 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 36.3
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 285.53 | 5085.34 |
| SPACE COOL | 1070.02 | 0.00 |
| HVAC AUX | 1223.96 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1903.50 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 1087.16 | 0.00 |
| TOTAL | 5570.18 | 5085.34 |

TOTAL SITE ENERGY 10655.40 MBTU 180.5 KBTU/SQFT-YR GROSS-AREA 180.5 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 21812.24 MBTU 369.5 KBTU/SQFT-YR GROSS-AREA 369.5 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 36.3
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE<br>IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 79.52 | 891.42 |
| SPACE COOL | 347.65 | 0.00 |
| HVAC AUX | 192.92 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 303.25 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 324.51 | 0.00 |
| TOTAL | 1247.85 | 891.42 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 2139.24 MBTU | 162.3 KBTU/SQFT-YR GROSS-AREA | 162.3 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 4638.62 MBTU | 351.9 KBTU/SQFT-YR GROSS-AREA | 351.9 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 4.5

PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 79.52 | 891.42 |
| SPACE COOL | 347.65 | 0.00 |
| HVAC AUX | 192.92 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 303.25 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 324.51 | 0.00 |
| TOTAL | 1247.85 | 891.42 |

TOTAL SITE ENERGY 2139.24 MBTU 162.3 KBTU/SQFT-YR GROSS-AREA 162.3 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 4638.62 MBTU 351.9 KBTU/SQFT-YR GROSS-AREA 351.9 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 4.5
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE<br>IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 230.21 | 4552.14 |
| SPACE COOL | 1267.76 | 0.00 |
| HVAC AUX | 1808.60 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 3329.45 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 412.70 | 0.00 |
| TOTAL | 7048.73 | 4552.14 |

TOTAL SITE ENERGY 11601.09 MBTU 157.0 KBTU/SQFT-YR GROSS-AREA 157.0 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 25720.15 MBTU 348.0 KBTU/SQFT-YR GROSS-AREA 348.0 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 0.0
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 1.1

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE<br>IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 230.21 | 4552.14 |
| SPACE COOL | 929.12 | 0.00 |
| HVAC AUX | 1808.60 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 3329.45 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 412.70 | 0.00 |
| TOTAL | 6710.09 | 4552.14 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 11262.45 MBTU | 152.4 KBTU/SQFT-YR GROSS-AREA | 152.4 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 24703.21 MBTU | 334.2 KBTU/SQFT-YR GROSS-AREA | 334.2 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 0.0
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 1.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 181.42 | 4735.99 |
| SPACE COOL | 984.55 | 0.00 |
| HVAC AUX | 337.24 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1706.99 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 675.53 | 0.00 |
| TOTAL | 3885.73 | 4735.99 |

TOTAL SITE ENERGY 8621.56 MBTU 116.2 KBTU/SQFT-YR GROSS-AREA 116.2 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 16404.38 MBTU 221.1 KBTU/SQFT-YR GROSS-AREA 221.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.8
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 181.42 | 4735.99 |
| SPACE COOL | 688.50 | 0.00 |
| HVAC AUX | 337.24 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1706.99 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 675.53 | 0.00 |
| TOTAL | 3589.69 | 4735.99 |

TOTAL SITE ENERGY 8325.51 MBTU 112.2 KBTU/SQFT-YR GROSS-AREA 112.2 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 15515.35 MBTU 209.1 KBTU/SQFT-YR GROSS-AREA 209.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.8
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE<br>IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 178.99 | 3457.19 |
| SPACE COOL | 1433.37 | 0.00 |
| HVAC AUX | 1108.49 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1512.83 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 566.01 | 0.00 |
| TOTAL | 4799.69 | 3457.19 |

TOTAL SITE ENERGY 8256.87 MBTU 142.9 KBTU/SQFT-YR GROSS-AREA 142.9 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 17870.65 MBTU 309.2 KBTU/SQFT-YR GROSS-AREA 309.2 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 48.6
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 1.3

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE<br>IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 178.99 | 3457.19 |
| SPACE COOL | 969.79 | 0.00 |
| HVAC AUX | 1108.49 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1512.83 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 566.01 | 0.00 |
| TOTAL | 4336.11 | 3457.19 |

TOTAL SITE ENERGY 7793.29 MBTU 134.8 KBTU/SQFT-YR GROSS-AREA 134.8 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 16478.51 MBTU 285.1 KBTU/SQFT-YR GROSS-AREA 285.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 48.6
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 1.3

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 398.05 | 1053.81 |
| SPACE COOL | 344.03 | 0.00 |
| HVAC AUX | 373.27 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 466.41 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 325.45 | 0.00 |
| TOTAL | 1907.21 | 1053.81 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 2961.09 MBTU | 91.3 KBTU/SQFT-YR GROSS-AREA | 91.3 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 6781.38 MBTU | 209.1 KBTU/SQFT-YR GROSS-AREA | 209.1 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.1
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 40.62 | 873.22 |
| SPACE COOL | 489.12 | 0.00 |
| HVAC AUX | 399.71 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 664.40 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 669.36 | 0.00 |
| TOTAL | 2263.21 | 873.22 |

TOTAL SITE ENERGY 3136.42 MBTU 165.3 KBTU/SQFT-YR GROSS-AREA 165.3 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 7669.62 MBTU 404.1 KBTU/SQFT-YR GROSS-AREA 404.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 3.3
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE<br>IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 63.02 | 1901.29 |
| SPACE COOL | 324.06 | 0.00 |
| HVAC AUX | 453.90 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 664.37 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 669.34 | 0.00 |
| TOTAL | 2174.70 | 1901.29 |

TOTAL SITE ENERGY 4076.03 MBTU 214.8 KBTU/SQFT-YR GROSS-AREA 214.8 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 8432.04 MBTU 444.3 KBTU/SQFT-YR GROSS-AREA 444.3 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.6
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 398.05 | 1053.81 |
| SPACE COOL | 282.73 | 0.00 |
| HVAC AUX | 373.27 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 466.41 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 325.45 | 0.00 |
| TOTAL | 1845.91 | 1053.81 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 2899.79 MBTU | 89.4 KBTU/SQFT-YR GROSS-AREA | 89.4 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 6597.30 MBTU | 203.4 KBTU/SQFT-YR GROSS-AREA | 203.4 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.1
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE<br>IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 40.62 | 873.22 |
| SPACE COOL | 351.33 | 0.00 |
| HVAC AUX | 399.71 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 664.39 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 669.36 | 0.00 |
| TOTAL | 2125.40 | 873.22 |

TOTAL SITE ENERGY 2998.63 MBTU 158.0 KBTU/SQFT-YR GROSS-AREA 158.0 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 7255.83 MBTU 382.3 KBTU/SQFT-YR GROSS-AREA 382.3 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 3.3
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 63.02 | 1901.29 |
| SPACE COOL | 254.85 | 0.00 |
| HVAC AUX | 453.90 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 664.37 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 669.33 | 0.00 |
| TOTAL | 2105.48 | 1901.29 |

TOTAL SITE ENERGY 4006.82 MBTU 211.1 KBTU/SQFT-YR GROSS-AREA 211.1 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 8224.21 MBTU 433.3 KBTU/SQFT-YR GROSS-AREA 433.3 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.6
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 133.98 | 3035.71 |
| SPACE COOL | 1096.12 | 0.00 |
| HVAC AUX | 1466.37 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1672.31 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 994.36 | 0.00 |
| TOTAL | 5363.14 | 3035.71 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 8398.77 MBTU | 112.3 KBTU/SQFT-YR GROSS-AREA | 112.3 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 19140.97 MBTU | 255.8 KBTU/SQFT-YR GROSS-AREA | 255.8 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 2.4
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 133.98 | 3035.71 |
| SPACE COOL | 745.81 | 0.00 |
| HVAC AUX | 1466.35 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 1672.29 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 994.35 | 0.00 |
| TOTAL | 5012.78 | 3035.71 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 8048.46 MBTU | 107.6 KBTU/SQFT-YR GROSS-AREA | 107.6 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 18089.01 MBTU | 241.8 KBTU/SQFT-YR GROSS-AREA | 241.8 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 2.4
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 40.00 | 764.80 |
| SPACE COOL | 597.47 | 0.00 |
| HVAC AUX | 159.66 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 737.12 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 430.90 | 0.00 |
| TOTAL | 1965.15 | 764.80 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 2729.95 MBTU | 123.9 KBTU/SQFT-YR GROSS-AREA | 123.9 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 6666.15 MBTU | 302.5 KBTU/SQFT-YR GROSS-AREA | 302.5 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 9.7
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 31.12 | 601.04 |
| SPACE COOL | 598.57 | 0.00 |
| HVAC AUX | 399.31 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 569.71 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 312.40 | 0.00 |
| TOTAL | 1911.12 | 601.04 |

TOTAL SITE ENERGY 2512.19 MBTU 109.8 KBTU/SQFT-YR GROSS-AREA 109.8 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 6340.23 MBTU 277.0 KBTU/SQFT-YR GROSS-AREA 277.0 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.4
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 32.17 | 621.20 |
| SPACE COOL | 601.67 | 0.00 |
| HVAC AUX | 402.21 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 569.72 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 306.02 | 0.00 |
| TOTAL | 1911.79 | 621.20 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 2532.99 MBTU | 110.7 KBTU/SQFT-YR GROSS-AREA | 110.7 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 6362.32 MBTU | 278.0 KBTU/SQFT-YR GROSS-AREA | 278.0 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.3
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE<br>IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 40.00 | 764.80 |
| SPACE COOL | 603.25 | 0.00 |
| HVAC AUX | 159.66 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 737.12 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 430.90 | 0.00 |
| TOTAL | 1970.92 | 764.80 |

TOTAL SITE ENERGY 2735.73 MBTU 124.1 KBTU/SQFT-YR GROSS-AREA 124.1 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 6683.49 MBTU 303.2 KBTU/SQFT-YR GROSS-AREA 303.2 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 9.7
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 31.12 | 601.04 |
| SPACE COOL | 571.57 | 0.00 |
| HVAC AUX | 399.31 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 569.71 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 312.40 | 0.00 |
| TOTAL | 1884.12 | 601.04 |

TOTAL SITE ENERGY 2485.20 MBTU 108.6 KBTU/SQFT-YR GROSS-AREA 108.6 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 6259.18 MBTU 273.5 KBTU/SQFT-YR GROSS-AREA 273.5 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.4
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

| ENERGY TYPE IN SITE MBTU - | ELECTRICITY | FUEL-OIL |
|---|---|---|
| CATEGORY OF USE | | |
| SPACE HEAT | 29.95 | 578.47 |
| SPACE COOL | 572.51 | 0.00 |
| HVAC AUX | 413.62 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 569.72 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 306.02 | 0.00 |
| TOTAL | 1891.83 | 578.47 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 2470.30 MBTU | 107.9 KBTU/SQFT-YR GROSS-AREA | 107.9 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 6259.66 MBTU | 273.5 KBTU/SQFT-YR GROSS-AREA | 273.5 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.3
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

# COST ESTIMATE

| | | | |
|---|---|---|---|
| Estimate: | ECO-7 | Date: | 22-Dec-94 |
| Description: | CENTRAL CHILLED WATER PLANT | | |
| Project: | ECIP / FEMP | Bid Date: | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 |
| Sq. footage: | | City indx: | Raleigh, NC |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 0001000000 | CONSTRUCT A 1250 FT^2 BUILDING FOR THE CHILLER PLANT INCLUDS LABOR | | | | | 1.00 EA | |
| Unit values | | 0.00 | 35000.00 | 0.00 | 0.00 | 0.00 | 35000.00 |
| Totals | | 0.00 | $35,000 | $0 | $0 | $0 | $35,000 |
| U00 | | 0 | $35,000 | $0 | $0 | $0 | $35,000 |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 0222580700 | EXCAV UTIL TRNCH COMMON EARTH, CHAIN TRNCHR 12HP OPERWLKG 8"W 24"DP | | | | | 3000.00 L.F. | |
| Unit values | | 0.02 | 0.00 | 0.45 | 0.20 | 0.00 | 0.65 |
| Totals | | 69.00 | $0 | $1,353 | $587 | $0 | $1,940 |
| 0251040460 | ASPHALTIC CONCRETE PAVEMENT, PAVING, BINDER COURSE, 3" THICK | | | | | 3000.00 S.Y. | |
| Unit values | | 0.02 | 4.35 | 0.35 | 0.31 | 0.00 | 5.02 |
| Totals | | 60.00 | $13,059 | $1,047 | $945 | $0 | $15,051 |
| U02 SITEWORK | | 129 | $13,059 | $2,400 | $1,532 | $0 | $16,991 |

| Line # | Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|---|
| 1517012110 | PIPE STEEL SCH 40 WELD JT ROLL HANGER FOR CVRG 10'OC BLK 4" DIAM | | | | | 1200.00 L.F. | |
| | Unit values | 0.43 | 9.44 | 6.66 | 0.83 | 0.00 | 16.93 |
| | Totals | 518.40 | $11,329 | $7,986 | $1,002 | $0 | $20,317 |
| 1517012130 | PIPE STEEL SCH 40 WELD JT ROLL HANGER FOR CVRG 10'OC BLK 6" DIAM | | | | | 2000.00 L.F. | |
| | Unit values | 0.67 | 18.48 | 10.65 | 0.86 | 0.00 | 29.99 |
| | Totals | 1334.00 | $36,963 | $21,296 | $1,718 | $0 | $59,977 |
| 1517012150 | PIPE STEEL SCH 40 WELD JT ROLL HANGER FOR CVRG 10'OC BLK 10" DIAM | | | | | 100.00 L.F. | |
| | Unit values | 1.00 | 48.95 | 16.03 | 1.29 | 0.00 | 66.27 |
| | Totals | 100.00 | $4,895 | $1,603 | $129 | $0 | $6,627 |
| 1524105620 | PUMP 6" X 25 HP 1550 GPM | | | | | 4.00 Ea. | |
| | Unit values | 17.14 | 2322.68 | 275.28 | 0.00 | 0.00 | 2597.95 |
| | Totals | 68.57 | $9,291 | $1,101 | $0 | $0 | $10,392 |
| 1524303140 | PMP GENUTL 1STG DBLSUC 5"DX6"S 50HP | | | | | 2.00 Ea. | |
| | Unit values | 72.73 | 7092.90 | 1164.63 | 0.00 | 0.00 | 8257.53 |
| | Totals | 145.45 | $14,186 | $2,329 | $0 | $0 | $16,515 |
| 1556516740 | PIPE CVR FBGL 1/2"THK ASJ 4" IPS | | | | | 1200.00 L.F. | |
| | Unit values | 0.10 | 1.24 | 1.46 | 0.00 | 0.00 | 2.70 |
| | Totals | 120.00 | $1,487 | $1,757 | $0 | $0 | $3,244 |
| 1556516760 | PIPE CVR FBGL 1/2" THK ASJ 6" IPS | | | | | 2000.00 L.F. | |
| | Unit values | 0.13 | 1.49 | 1.95 | 0.00 | 0.00 | 3.44 |
| | Totals | 266.00 | $2,977 | $3,908 | $0 | $0 | $6,885 |
| 1556517000 | PIPE CVR FBGL 1"THK ASJ 10" IPS | | | | | 100.00 L.F. | |
| | Unit values | 0.18 | 3.05 | 2.60 | 0.00 | 0.00 | 5.65 |
| | Totals | 17.80 | $305 | $260 | $0 | $0 | $565 |
| 1571900320 | AC&V CHILLR WTRCOOL HERMCENT750TON | | | | | 3.00 Ea. | |
| | Unit values | 0.00 | 168930.90 | 32730.50 | 0.00 | 0.00 | 201661.40 |
| | Totals | 0.00 | $506,793 | $98,192 | $0 | $0 | $604,985 |
| 1572402150 | COOLING TOWER,INDUCED,GEARED 750TON | | | | | 2250.00 TonAC | |
| | Unit values | 0.17 | 37.96 | 2.70 | 0.00 | 0.00 | 40.67 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Totals | 380.25 | $85,415 | $6,085 | $0 | $0 | $91,500 |
| 1572403500 | COOLING TOWER PUMPS & PIPING ADD | | | | 2250.00 TonAC | |
| Unit values | 0.63 | 33.47 | 10.10 | 0.00 | 0.00 | 43.57 |
| Totals | 1422.00 | $75,300 | $22,733 | $0 | $0 | $98,033 |

| Line # Description | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U15 MECHANICAL | 4373 | $748,941 | $167,250 | $2,849 | $0 | $919,040 |
| ESTIMATE TOTAL | 4502 | $797,000 | $169,650 | $4,381 | $0 | $971,031 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $37,323 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $797,000 | $206,973 | $4,381 | $0 | $1,008,354 |
| CONTINGENCY | 15.00% | | | | | $151,253 |
| BOND | 3.00% | | | | | $30,251 |
| PROFIT | 10.00% | | | | | $100,835 |
| JOB TOTAL | | | | | | $1,290,693 |

| | | | |
|---|---|---|---|
| Estimate: | ECO-7 | Date: | 22-Dec-94 |
| Description: | CENTRAL CHILLED WATER PLANT | | |
| Project: | ECIP / FEMP | Bid Date: | |
| Location: | FORT BRAGG NC | Job #: | 94013.05 |
| Sq. footage: | | City indx: | Raleigh, NC |

SUMMARY

| | Manhours | Matl | Labor | Equipment | Sub | Total |
|---|---|---|---|---|---|---|
| U00 | 0 | $35,000 | $0 | $0 | $0 | $35,000 |
| U02 SITEWORK | 129 | $13,059 | $2,400 | $1,532 | $0 | $16,991 |
| U15 MECHANICAL | 4373 | $748,941 | $167,250 | $2,849 | $0 | $919,040 |
| TOTAL | 4502 | $797,000 | $169,650 | $4,381 | $0 | $971,031 |
| SALES TAX | 0.00% | $0 | | | | |
| MATL MARKUP | 0.00% | $0 | | | | |
| LABOR MARKUP | 22.00% | | $37,323 | | | |
| EQUIPT MARKUP | 0.00% | | | $0 | | |
| SUB MARKUP | 5.00% | | | | $0 | |
| TOTAL BEFORE CONTINGENC | | $797,000 | $206,973 | $4,381 | $0 | $1,008,354 |
| CONTINGENCY | 15.00% | | | | | $151,253 |
| BOND | 3.00% | | | | | $30,251 |
| PROFIT | 10.00% | | | | | $100,835 |
| JOB TOTAL | | | | | | $1,290,693 |

The calculations for ECOs 2, 4, 5, 6, and 7 were performed using the DOE Building Simulation program. The DOE program simulates a building's annual energy performance by modeling all energy consuming systems within that building. Heating and cooling loads are calculated on an hourly basis using local weather data. The user inputs criteria such as building envelope materials, lighting and occupant loading, HVAC equipment type and zoning. Details of the user input data and assumptions used in the simulations can be found in *Section 5.3* of the report. This section contains sample DOE input and output files for the baseline run of one building (1242).

# TABLE OF CONTENTS

# SAMPLE DOE 2
# INPUT AND
# OUTPUT FILES
# (BUILDING 1242 BASELINE)

# SAMPLE DOE 2
# INPUT FILE
# (BUILDING 1242 BASELINE)

```
INPUT LOADS ..
TITLE LINE-1 *FT BRAGG ENERGY STUDY* ..
TITLE LINE-2 *HISTORIC RED BRICK BLDG AREA* ..
TITLE LINE-3 *BUILDING 1242* ..
TITLE LINE-4 *BASE CASE* ..
TITLE LINE-5 *PRESENT ENERGY USAGE* ..

RUN-PERIOD FROM JAN 1 1994 THRU DEC 31 1994 ..
ABORT ERRORS ..
DIAGNOSTIC COMMENTS NARROW ..
LOADS-REPORT V=(LV-A,LV-B,LV-D,LV-I) S=(LS-A,LS-C,LS-D) ..

BUILDING-LOCATION
D-S=YES  AZ=90   T-Z=5 ..

$CONSTRUCTION INPUTS

WALL      = LAYERS MATERIAL=(HF-A7,HF-B1,HF-C7,HF-E1) ..
ROOF1     = LAYERS MATERIAL=(HF-E2,HF-E3,HF-B2,HF-C14,HF-E4,HF-E5) ..
WALLBOT   = CONS LAYERS=WALL ABS=.88 RO=2 ..
BUROOF    = CONS LAYERS=ROOF1 ABS=.75 RO=3 ..
CLEAR     = G-T PANES=2  S-C=0.7 ..
FLOOR     = CONS U=.20 ..
METALDOOR = CONS U=0.59 ..
INTWALL   = CONS U=.40 ..

$ OCCUPANCY SCHEDULE FOR BILLETED AREAS (KITCHEN,SECOND&THIRD FLOORS)
  OC-DS1     = D-SCH (1,6)(1)(7,17)(.25)(18,24)(1) ..
  OC-WEHDS1  = D-SCH (1,24)(.75) ..
  OC-WS1     = W-SCH (WD) OC-DS1 (WEH) OC-WEHDS1 ..
  OC-SCH1    = SCHEDULE THRU DEC 31 OC-WS1 ..

$ OCCUPANCY SCHEDULE FOR FIRST FLOOR OFFICES ON FIRST FLOOR
  OC-DS2     = D-SCH (1,6)(0)(7,17)(1)(18,24)(0) ..
  OC-WEHDS2  = D-SCH (1,24)(0) ..
  OC-WS2     = W-SCH (WD) OC-DS2 (WEH) OC-WEHDS2 ..
  OC-SCH2    = SCHEDULE THRU DEC 31 OC-WS2 ..

$ LIGHTING SCHEDULE FOR BILLETED AREAS
  LT-DS1     = D-SCH (1,5)(.2)(6,7)(1)(8,17)(.25)(18,22)(1)(23,24)(.2) ..
  LT-WEHDS1  = D-SCH (1,24)(.5) ..
  LT-WS1     = W-SCH (WD) LT-DS1 (WEH) LT-WEHDS1 ..
  LT-SCH1    = SCHEDULE THRU DEC 31 LT-WS1 ..

$ LIGHTING SCHEDULE FOR OFFICE AREAS
  LT-DS2     = D-SCH (1,6)(.1)(7,17)(1)(18,24)(.1) ..
  LT-WEHDS2  = D-SCH (1,24)(.1) ..
  LT-WS2     = W-SCH (WD) LT-DS2 (WEH) LT-WEHDS2 ..
  LT-SCH2    = SCHEDULE THRU DEC 31 LT-WS2 ..

$ EQUIPMENT SCHEDULE FOR BILLETED AREAS
  EQ-DS1     = D-SCH (1,5)(0)(6,7)(1)(8,17)(.25)(18,22)(1)(23,24)(0) ..
  EQ-WEHDS1  = D-SCH (1,24)(.5) ..
  EQ-WS1     = W-SCH (WD) EQ-DS1 (WEH) EQ-WEHDS1 ..
  EQ-SCH1    = SCHEDULE THRU DEC 31 EQ-WS1 ..

$ EQUIPMENT SCHEDULE FOR OFFICE AREAS
  EQ-DS2     = D-SCH (1,6)(0)(7,17)(1)(18,24)(0) ..
  EQ-WEHDS2  = D-SCH (1,24)(0) ..
  EQ-WS2     = W-SCH (WD) EQ-DS2 (WEH) EQ-WEHDS2 ..
  EQ-SCH2    = SCHEDULE THRU DEC 31 EQ-WS2 ..

$ INFILTRATION SCHEDULE FOR AREAS WITH OUTSIDE DOORS
  INF-DS     = D-SCH (1,6)(1)(7,17)(1.5)(18,24)(1) ..
  INF-WEHDS  = D-SCH (1,24)(1) ..
```

```
  INF-WS      = W-SCH (WD) INF-DS (WEH) INF-WEHDS ..
  INF-SCH     = SCHEDULE THRU DEC 31 INF-WS ..

$ SPACE CONDITIONS
  BILLET=S-C
  T=(74)                    P-SCH=OC-SCH1
  P-H-L=200                 P-H-S=200
  L-SCH=LT-SCH1             E-SCH=EQ-SCH1
  L-T=SUS-FLUOR             L-T-S=1.0
  INF-METHOD=AIR-CHANGE     AIR-CHANGES/HR=1 ..

  OFFICE=S-C
  T=(74)                     P-SCH=OC-SCH2
  P-H-L=200                  P-H-S=200
  L-SCH=LT-SCH2              E-SCH=EQ-SCH2
  L-T=SUS-FLUOR              L-T-S=1.0
  INF-METHOD=AIR-CHANGE      AIR-CHANGES/HR=1 ..

  SET-DEFAULT FOR SPACE F-W=80 ..
  SET-DEFAULT FOR WINDOW G-T=CLEAR ..
  SET-DEFAULT FOR EXTERIOR-WALL CONS=WALLBOT H=18 ..
  SET-DEFAULT FOR UNDERGROUND-FLOOR CONS=FLOOR ..
  SET-DEFAULT FOR DOOR CONS=METALDOOR ..
  SET-DEFAULT FOR INTERIOR-WALL CONS=INTWALL ..
  SET-DEFAULT FOR ROOF CONS=BUROOF ..

$ SPACE INPUT
$ KITCHEN AREA ON FIRST FLOOR
  KITCHEN=S  X=0  Y=0  Z=0   AZ=0  A=2880 V=25920  S-C=BILLET  L-W=2.0
  N-O-P=15 E-KW=2  ..
  K-NWALL1=E-W AZ=0          X=32   Y=90   W=32  H=12        ..
  K-NWALL2=E-W AZ=0          X=0    Y=40   W=32  H=12        ..
  K-EWALL=E-W AZ=80          X=66   Y=37   W=50  H=12        ..
  K-SWALL=E-W AZ=180         X=0    Y=0    W=50  H=12        ..
  K-SWWIND=WI G-T=CLEAR      X=0    Y=0    H=5   W=3   M=6   ..
  K-WWALL1=E-W AZ=270        X=0    Y=40   W=40  H=12        ..
  K-WWWIND1=WI G-T=CLEAR     X=0    Y=0    H=5   W=3   M=2   ..
  K-WWALL2=E-W AZ=270        X=32   Y=40   W=50  H=12        ..

$ FIRST FLOOR
  FIRSTFL=S  X=50  Y=0  Z=0   AZ=0   A=2600 V=23400   S-C=OFFICE  L-W=2.0
  N-O-P=12  E-KW=4  I-SCH=INF-SCH ..
  FF-NWALL=E-W AZ=0          X=16   Y=40   W=48  H=12        ..
  FF-NWWIND=WI G-T=CLEAR     X=0    Y=0    H=5   W=3   M=2   ..
  FF-EWALL=E-W AZ=80         X=65   Y=0    W=40  H=12        ..
  FF-SWALL=E-W AZ=180        X=0    Y=0    W=65  H=12        ..
  FF-SWWIND=WI G-T=CLEAR     X=0    Y=0    H=5   W=3   M=6   ..

$ SECOND FLOOR
  SECONDFL=S   X=0   Y=0  Z=15   AZ=0  A=6304 V=56736   S-C=BILLET  L-W=2.5
  N-O-P=30  E-KW=7 ..
  SF-NWALL1=E-W AZ=0         X=0    Y=40   W=32  H=12        ..
  SF-NWWIND1=WI G-T=CLEAR    X=0    Y=0    H=5   W=3   M=4   ..
  SF-NWALL2=E-W AZ=0         X=64   Y=88   W=16  H=12        ..
  SF-NWWIND2=WI G-T=CLEAR    X=0    Y=0    H=5   W=3   M=2   ..
  SF-NWALL3=E-W AZ=0         X=80   Y=48   W=32  H=12        ..
  SF-NWWIND3=WI G-T=CLEAR    X=0    Y=0    H=5   W=3   M=4   ..
  SF-EWALL1=E-W AZ=80        X=80   Y=70   W=18  H=12        ..
  SF-EWALL2=E-W AZ=80        X=112  Y=0    W=48  H=12        ..
  SF-SWALL=E-W AZ=180        X=0    Y=0    W=112 H=12        ..
  SF-SWWIND=WI G-T=CLEAR     X=0    Y=0    H=5   W=3   M=13  ..
  SF-WWALL1=E-W AZ=270       X=0    Y=40   W=40  H=12        ..
  SF-WWWIND1=WI G-T=CLEAR    X=0    Y=0    H=5   W=3   M=4   ..
  SF-WWALL2=E-W AZ=270       X=32   Y=30   W=30  H=12        ..
  SF-WWWIND2=WI G-T=CLEAR    X=0    Y=0    H=5   W=3   M=3   ..
```

```
$ SECOND FLOOR BATHROOM
  SFBATH=S  X=32  Y=66  Z=15   AZ=0  A=576  V=6912   S-C=BILLET   L-W=2.5
  N-O-P=2  E-KW=0  I-SCH=INF-SCH ..
  SFBATH-NWALL=E-W AZ=0       X=32   Y=18   W=32  H=12        ..
  SFBATH-EWALL=E-W AZ=80      X=32   Y=0    W=18  H=12        ..
  SFBATH-EWWIND=WI G-T=CLEAR  X=0    Y=0    H=5   W=3   M=2   ..
  SFBATH-WWALL=E-W AZ=270     X=0    Y=18   W=18  H=12        ..

$ THIRD FLOOR
  THIRDFL=S   X=0   Y=126  Z=30  AZ=0  A=6304 V=56736   S-C=BILLET  L-W=2.5
  N-O-P=30  E-KW=7 ..
  TF-NWALL1=E-W AZ=0          X=0    Y=40   W=32  H=12        ..
  TF-NWWIND1=WI G-T=CLEAR     X=0    Y=0    H=5   W=3   M=4   ..
  TF-NWALL2=E-W AZ=0          X=64   Y=88   W=16  H=12        ..
  TF-NWWIND2=WI G-T=CLEAR     X=0    Y=0    H=5   W=3   M=2   ..
  TF-NWALL3=E-W AZ=0          X=80   Y=48   W=32  H=12        ..
  TF-NWWIND3=WI G-T=CLEAR     X=0    Y=0    H=5   W=3   M=4   ..
  TF-EWALL1=E-W AZ=80         X=80   Y=70   W=18  H=12        ..
  TF-EWALL2=E-W AZ=80         X=112  Y=0    W=48  H=12        ..
  TF-SWALL=E-W AZ=180         X=0    Y=0    W=112 H=12        ..
  TF-SWWIND=WI G-T=CLEAR      X=0    Y=0    H=5   W=3   M=13  ..
  TF-WWALL1=E-W AZ=270        X=0    Y=40   W=40  H=12        ..
  TF-WWWIND1=WI G-T=CLEAR     X=0    Y=0    H=5   W=3   M=4   ..
  TF-WWALL2=E-W AZ=270        X=32   Y=30   W=30  H=12        ..
  TF-WWWIND2=WI G-T=CLEAR     X=0    Y=0    H=5   W=3   M=3   ..
  TF-ROOF=ROOF CONS=BUROOF    W=79.4 H=79.4 TILT=0            ..

$ THIRD FLOOR BATHROOM
  TFBATH=S    X=0    Y=56  Z=30   AZ=0   A=576  V=6912   S-C=BILLET   L-W=2.5
  N-O-P=2 E-KW=0  I-SCH=INF-SCH ..
  TFBATH-NWALL=E-W AZ=0       X=32   Y=18   W=32  H=12        ..
  TFBATH-EWALL=E-W AZ=80      X=32   Y=0    W=18  H=12        ..
  TFBATH-EWWIND=WI G-T=CLEAR  X=0    Y=0    H=5   W=3   M=2   ..
  TFBATH-WWALL=E-W AZ=270     X=0    Y=18   W=18  H=12        ..
  TFBATH-ROOF=ROOF CONS=BUROOF       W=24   H=24  TILT=0      ..

  END ..
  COMPUTE LOADS ..

$ SYSTEMS INPUT
  INPUT SYSTEMS ..

  SYSTEMS-REPORT V=(SV-A,SV-B) S=(SS-A,SS-B,SS-D,SS-F,SS-G,
  SS-I,SS-J,SS-K,SS-L,SS-M) ..

$ HEATING AND COOLING DAY SCHEDULES
  HTDS    = D-SCH (1,24) (80) ..
  CLDS    = D-SCH (1,24) (70) ..

$ HEATING AND COOLING WEEK SCHEDULES
  HTWS    = W-SCH (ALL) HTDS ..
  CLWS    = W-SCH (ALL) CLDS ..
  HTSCH   = SCHEDULE THRU DEC 31 HTWS ..
  CLSCH   = SCHEDULE THRU DEC 31 CLWS ..

$ HEATING AND COOLING AVAILABILITY SCHEDULES
  HTAVDS  = D-SCH (1,24) (1) ..
  HTAVDS2 = D-SCH (1,24) (0) ..
  CLAVDS  = D-SCH (1,24) (1) ..
  CLAVDS2 = D-SCH (1,24) (0) ..

  HTAVWS  = W-SCH (ALL) HTAVDS ..
  HTAVWS2 = W-SCH (ALL) HTAVDS2 ..
  CLAVWS  = W-SCH (ALL) CLAVDS ..
  CLAVWS2 = W-SCH (ALL) CLAVDS2 ..
  HTAVSCH = SCHEDULE THRU APR 15 HTAVWS
```

```
                    THRU OCT 15 HTAVWS2
                    THRU DEC 31 HTAVWS ..
CLAVSCH = SCHEDULE THRU APR 15 CLAVWS2
                    THRU OCT 15 CLAVWS
                    THRU DEC 31 CLAVWS2 ..

  $ ZONE CONTROL
    ZNCTL=Z-C    D-H-T=72
                 D-C-T=76
                 B-C=THERMOSTATIC
                 C-T-SCH=CLSCH
                 H-T-SCH=HTSCH
                 T-TYPE=PROPORTIONAL ..

  $ ZONE INPUTS
    KITCHEN =Z    Z-C=ZNCTL  S-O=ADJUST-LOADS  ..
    FIRSTFL =Z    Z-C=ZNCTL  S-O=ADJUST-LOADS  ..
    SECONDFL=Z    Z-C=ZNCTL  S-O=ADJUST-LOADS  A-CFM=4539 ..
    SFBATH  =Z    Z-C=ZNCTL  S-O=ADJUST-LOADS  E-CFM=300 B-R=-30000 ..
    THIRDFL =Z    Z-C=ZNCTL  S-O=ADJUST-LOADS  A-CFM=4539 ..
    TFBATH  =Z    Z-C=ZNCTL  S-O=ADJUST-LOADS  E-CFM=300 B-R=-30000 ..

  $ SYSTEM CONTROL INPUT
    SYSCTL=S-C   MIN-S-T=50 MAX-S-T=120
                 H-SCH=HTAVSCH C-SCH=CLAVSCH ..

  $ SYSTEM INPUT
    KITCHENSYS=SYSTEM   SYSTEM-TYPE=SZRH
                        S-C=SYSCTL
                        HEAT-SOURCE=HOT-WATER
                        MIN-OUTSIDE-AIR=1.0
                        Z-N=(KITCHEN) ..

    BUILDING=SYSTEM     SYSTEM-TYPE=SZRH
                        S-C=SYSCTL
                        HEAT-SOURCE=HOT-WATER
                        BASEBOARD-SOURCE=HOT-WATER
                        MIN-OUTSIDE-AIR=.2
                        Z-N=(FIRSTFL,SECONDFL,THIRDFL,SFBATH,TFBATH) ..

    BATHSYS=SYSTEM      SYSTEM-TYPE=HVSYS
                        S-C=SYSCTL
                        H-CAP=0
                        S-KW=0
                        BASEBOARD-SOURCE=HOT-WATER
                        Z-N=(KITCHEN) ..

    END ..
    COMPUTE SYSTEMS ..
$-------------------------------------------------$
$---------------   PLANT PROGRAM  ---------------$
$-------------------------------------------------$

  $ DATA INPUT TO SIMULATE OIL-FIRED BOILER
    INPUT PLANT ..

    HWBLR=PLANT-EQUIPMENT TYPE=HW-BOILER  SIZE=2.0 ..
    ACCHLR=PLANT-EQUIPMENT TYPE=HERM-REC-CHLR  SIZE=1.2 ..

    PLANT-PARAMETERS
    BOILER-CONTROL=DEMAND-ONLY BOILER-FUEL=FUEL-OIL
    HW-BOILER-HIR=1.3
    HCIRC-DESIGN-T-DROP=20  HCIRC-LOSS=.10   HCIRC-HEAD=80
    HCIRC-IMPELLER-EFF=0.70   HCIRC-MOTOR-EFF=0.85
    CHILLER-CONTROL=DEMAND-ONLY HERM-REC-COND-TYPE=AIR  ..
```

```
PLANT-REPORT V=(PV-A) S=(PS-A,PS-B,PS-C,PS-D,BEPS) ..

END ..
COMPUTE PLANT ..
STOP ..
```

# SAMPLE DOE 2
# OUTPUT FILE
# (BUILDING 1242 BASELINE)

BUILDING ENERGY ANALYSIS PROGRAM

DEVELOPED BY
LAWRENCE BERKELEY LABORATORY/UNIVERSITY OF CALIFORNIA

WITH MAJOR SUPPORT FROM
UNITED STATES DEPARTMENT OF ENERGY
ASSISTANT SECRETARY FOR CONSERVATION AND RENEWABLE ENERGY
OFFICE OF BUILDINGS ENERGY RESEARCH AND DEVELOPMENT
BUILDING SYSTEMS DIVISION



LBL RELEASE AUG 1986

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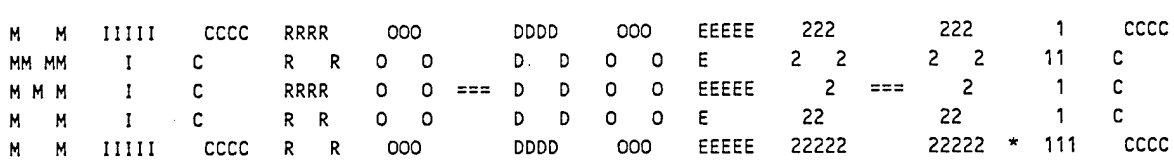

MODIFIED BY
ACROSOFT INTERNATIONAL,INC. / DENVER, COLORADO

PERIOD OF STUDY

| STARTING DATE | ENDING DATE | NUMBER OF DAYS |
|---|---|---|
| 1 JAN 1994 | 31 DEC 1994 | 365 |

SITE CHARACTERISTIC DATA

| | STATION NAME | LATITUDE (DEG) | LONGITUDE (DEG) | ALTITUDE (FT) | | TIME ZONE | BUILDING AZIMUTH (DEG) |
|---|---|---|---|---|---|---|---|
| TMY | RALEIGH, NC | 35.5 | 83.6 | 0. | 5 | EST | 90.0 |

RAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 LDL RUN 1
BUILDING 1242 BASE CASE PRESENT ENERGY USAGE
REPORT- LV-B SUMMARY OF SPACES OCCURRING IN THE PROJECT WEATHER FILE- TMY RALEIGH, NC

NUMBER OF SPACES 6 EXTERIOR 6 INTERIOR 0

| SPACE | SPACE MULT. | SPACE TYPE | AZIMUTH | LIGHTING (WATTS/ SQFT ) | PEOPLE | EQUIP. (WATTS/ SQFT ) | INFILTRATION METHOD | AIR CHANGES PER HOUR | FLOW RATE (CFM/SQFT) | AREA (SQFT ) | VOLUME (CUFT ) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| KITCHEN | 1.00 | EXT | 0.0 | 2.00 | 15.0 | 0.00 | AIR-CHANGE | 1.00 | 0.00 | 2880. | 25920. |
| FIRSTFL | 1.00 | EXT | 0.0 | 2.00 | 12.0 | 0.00 | AIR-CHANGE | 1.00 | 0.00 | 2600. | 23400. |
| SECONDFL | 1.00 | EXT | 0.0 | 2.50 | 30.0 | 0.00 | AIR-CHANGE | 1.00 | 0.00 | 6304. | 56736. |
| SFBATH | 1.00 | EXT | 0.0 | 2.50 | 2.0 | 0.00 | AIR-CHANGE | 1.00 | 0.00 | 576. | 6912. |
| THIRDFL | 1.00 | EXT | 0.0 | 2.50 | 30.0 | 0.00 | AIR-CHANGE | 1.00 | 0.00 | 6304. | 56736. |
| TFBATH | 1.00 | EXT | 0.0 | 2.50 | 2.0 | 0.00 | AIR-CHANGE | 1.00 | 0.00 | 576. | 6912. |
| BUILDING TOTALS | | | | | 91.0 | | | | | 19240.00 | 176616.00 |

FT BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 LDL RUN 1
[redacted]DING 1242 BASE CASE PRESENT ENERGY USAGE
REPORT- LV-D DETAILS OF EXTERIOR SURFACES IN THE PROJECT WEATHER FILE- TMY RALEIGH, NC

NUMBER OF EXTERIOR SURFACES 33 RECTANGULAR 33 OTHER 0

| SURFACE | SPACE | GLASS U-VALUE (BTU/HR - SQFT) | GLASS AREA (SQFT) | WALL U-VALUE (BTU/HR - SQFT) | WALL AREA (SQFT) | WALL+GLASS U-VALUE (BTU/HR - SQFT) | WALL+GLASS AREA (SQFT) | AZIMUTH |
|---|---|---|---|---|---|---|---|---|
| K-WWALL1 | KITCHEN | 0.49 | 30.00 | 0.09 | 450.00 | 0.12 | 480.00 | NORTH |
| K-WWALL2 | KITCHEN | 0.00 | 0.00 | 0.09 | 600.00 | 0.09 | 600.00 | NORTH |
| SF-WWALL1 | SECONDFL | 0.49 | 60.00 | 0.09 | 420.00 | 0.14 | 480.00 | NORTH |
| SF-WWALL2 | SECONDFL | 0.49 | 45.00 | 0.09 | 315.00 | 0.14 | 360.00 | NORTH |
| SFBATH-WWALL | SFBATH | 0.00 | 0.00 | 0.09 | 216.00 | 0.09 | 216.00 | NORTH |
| TF-WWALL1 | THIRDFL | 0.49 | 60.00 | 0.09 | 420.00 | 0.14 | 480.00 | NORTH |
| [redacted]WALL2 | THIRDFL | 0.49 | 45.00 | 0.09 | 315.00 | 0.14 | 360.00 | NORTH |
| TFBATH-WWALL | TFBATH | 0.00 | 0.00 | 0.09 | 216.00 | 0.09 | 216.00 | NORTH |
| K-NWALL1 | KITCHEN | 0.00 | 0.00 | 0.09 | 384.00 | 0.09 | 384.00 | EAST |
| K-NWALL2 | KITCHEN | 0.00 | 0.00 | 0.09 | 384.00 | 0.09 | 384.00 | EAST |
| SFBATH-NWALL | SFBATH | 0.00 | 0.00 | 0.09 | 384.00 | 0.09 | 384.00 | EAST |
| FF-NWALL | FIRSTFL | 0.49 | 30.00 | 0.09 | 546.00 | 0.11 | 576.00 | EAST |
| TF-NWALL1 | THIRDFL | 0.49 | 60.00 | 0.09 | 324.00 | 0.16 | 384.00 | EAST |
| TF-NWALL2 | THIRDFL | 0.49 | 30.00 | 0.09 | 162.00 | 0.16 | 192.00 | EAST |
| TF-NWALL3 | THIRDFL | 0.49 | 60.00 | 0.09 | 324.00 | 0.16 | 384.00 | EAST |
| SF-NWALL1 | SECONDFL | 0.49 | 60.00 | 0.09 | 324.00 | 0.16 | 384.00 | EAST |
| SF-NWALL2 | SECONDFL | 0.49 | 30.00 | 0.09 | 162.00 | 0.16 | 192.00 | EAST |
| TFBATH-NWALL | TFBATH | 0.00 | 0.00 | 0.09 | 384.00 | 0.09 | 384.00 | EAST |
| SF-NWALL3 | SECONDFL | 0.49 | 60.00 | 0.09 | 324.00 | 0.16 | 384.00 | EAST |
| SF-EWALL1 | SECONDFL | 0.00 | 0.00 | 0.09 | 216.00 | 0.09 | 216.00 | SOUTH |
| [redacted]EWALL1 | THIRDFL | 0.00 | 0.00 | 0.09 | 216.00 | 0.09 | 216.00 | SOUTH |
| TF-EWALL2 | THIRDFL | 0.00 | 0.00 | 0.09 | 576.00 | 0.09 | 576.00 | SOUTH |

(CONTINUED)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| SFBATH-EWALL | SFBATH | 0.49 | 30.00 | 0.09 | 186.00 | 0.15 | 216.00 | SOUTH |
| SF-EWALL2 | SECONDFL | 0.00 | 0.00 | 0.09 | 576.00 | 0.09 | 576.00 | SOUTH |
| FF-EWALL | FIRSTFL | 0.00 | 0.00 | 0.09 | 480.00 | 0.09 | 480.00 | SOUTH |
| TFBATH-EWALL | TFBATH | 0.49 | 30.00 | 0.09 | 186.00 | 0.15 | 216.00 | SOUTH |
| K-EWALL | KITCHEN | 0.00 | 0.00 | 0.09 | 600.00 | 0.09 | 600.00 | SOUTH |
| SF-SWALL | SECONDFL | 0.49 | 195.00 | 0.09 | 1149.00 | 0.15 | 1344.00 | WEST |
| FF-SWALL | FIRSTFL | 0.49 | 90.00 | 0.09 | 690.00 | 0.14 | 780.00 | WEST |
| TF-SWALL | THIRDFL | 0.49 | 195.00 | 0.09 | 1149.00 | 0.15 | 1344.00 | WEST |
| K-SWALL | KITCHEN | 0.49 | 90.00 | 0.09 | 510.00 | 0.15 | 600.00 | WEST |
| TF-ROOF | THIRDFL | 0.00 | 0.00 | 0.09 | 6304.36 | 0.09 | 6304.36 | ROOF |
| TFBATH-ROOF | TFBATH | 0.00 | 0.00 | 0.09 | 576.00 | 0.09 | 576.00 | ROOF |

| | AVERAGE U-VALUE/GLASS (BTU/HR - SQFT) | AVERAGE U-VALUE/WALLS (BTU/HR - SQFT) | AVERAGE U-VALUE WALLS+GLASS (BTU/HR - SQFT) | GLASS AREA (SQFT) | OPAQUE AREA (SQFT) | GLASS+OPAQUE AREA (SQFT) |
|---|---|---|---|---|---|---|
| NORTH | 0.49 | 0.09 | 0.12 | 240.00 | 2952.00 | 3192.00 |
| EAST | 0.49 | 0.09 | 0.13 | 330.00 | 3702.00 | 4032.00 |
| SOUTH | 0.49 | 0.09 | 0.10 | 60.00 | 3036.00 | 3096.00 |
| WEST | 0.49 | 0.09 | 0.15 | 570.00 | 3498.00 | 4068.00 |
| ROOF | 0.00 | 0.09 | 0.09 | 0.00 | 6880.36 | 6880.36 |
| ALL WALLS | 0.49 | 0.09 | 0.13 | 1200.00 | 13188.00 | 14388.00 |
| WALLS+ROOFS | 0.49 | 0.09 | 0.12 | 1200.00 | 20068.36 | 21268.36 |
| BUILDING | 0.49 | 0.09 | 0.12 | 1200.00 | 20068.36 | 21268.36 |

NUMBER OF CONSTRUCTIONS 5 DELAYED 2 QUICK 3

| CONSTRUCTION NAME | U-VALUE (BTU/HR - SQFT) | SURFACE ABSORPTANCE | SURFACE ROUGHNESS INDEX | SURFACE TYPE | NUMBER OF RESPONSE FACTORS |
|---|---|---|---|---|---|
| WALLBOT | 0.24 | 0.88 | 2 | DELAYED | 17 |
| BUROOF | 0.10 | 0.75 | 3 | DELAYED | 8 |
| FLOOR | 0.20 | 0.70 | 3 | QUICK | 0 |
| METALDOOR | 0.59 | 0.70 | 3 | QUICK | 0 |
| INTWALL | 0.40 | 0.70 | 3 | QUICK | 0 |

BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 LDL RUN 1
LDING 1242 BASE CASE PRESENT ENERGY USAGE
REPORT- LS-A SPACE PEAK LOADS SUMMARY WEATHER FILE- TMY RALEIGH, NC

| SPACE NAME | MULTIPLIER SPACE | MULTIPLIER FLOOR | COOLING LOAD (KBTU/HR) | TIME OF PEAK | DRY-BULB | WET-BULB | HEATING LOAD (KBTU/HR) | TIME OF PEAK | DRY-BULB | WET-BULB |
|---|---|---|---|---|---|---|---|---|---|---|
| KITCHEN | 1. | 1. | 40.982 | MAY 31 6 PM | 86.F | 68.F | -53.148 | JAN 21 12 MDNT | 36.F | 33.F |
| FIRSTFL | 1. | 1. | 53.154 | AUG 31 5 PM | 88.F | 71.F | -51.691 | JAN 16 10 AM | 14.F | 13.F |
| SECONDFL | 1. | 1. | 107.681 | MAY 31 6 PM | 86.F | 68.F | -109.891 | JAN 21 12 MDNT | 36.F | 33.F |
| SFBATH | 1. | 1. | 9.435 | AUG 31 3 PM | 87.F | 70.F | -20.064 | FEB 9 10 AM | 23.F | 20.F |
| THIRDFL | 1. | 1. | 121.226 | JUN 28 8 PM | 90.F | 77.F | -121.494 | JAN 17 1 PM | 19.F | 16.F |
| TFBATH | 1. | 1. | 10.884 | SEP 6 6 PM | 95.F | 75.F | -22.477 | FEB 9 10 AM | 23.F | 20.F |
| SUM | | | 343.362 | | | | -378.765 | | | |
| BUILDING PEAK | | | 315.056 | MAY 31 6 PM | 86.F | 68.F | -362.760 | JAN 21 12 MDNT | 36.F | 33.F |

RAGG ENERGY STUDY — HISTORIC RED BRICK BLDG AREA — DOE-2.1C 2/21/1995 11: 6:41 LDL RUN 1
DING 1242 — BASE CASE — PRESENT ENERGY USAGE
REPORT- LS-C BUILDING PEAK LOAD COMPONENTS — WEATHER FILE- TMY RALEIGH, NC

*** BUILDING ***

| | | | | |
|---|---|---|---|---|
| FLOOR AREA | 19240 | SQFT | 1787 | SQMT |
| VOLUME | 176616 | CUFT | 5002 | CUMT |

| | COOLING LOAD | | HEATING LOAD | |
|---|---|---|---|---|
| TIME | MAY 31 6PM | | JAN 21 12MDNT | |
| DRY-BULB TEMP | 86F | 30C | 36F | 2C |
| WET-BULB TEMP | 68F | 20C | 33F | 1C |

| | SENSIBLE (KBTU/H) | SENSIBLE ( KW ) | LATENT (KBTU/H) | LATENT ( KW ) | SENSIBLE (KBTU/H) | SENSIBLE ( KW ) |
|---|---|---|---|---|---|---|
| WALLS | 14.460 | 4.235 | 0.000 | 0.000 | -18.405 | -5.391 |
| ROOFS | 12.456 | 3.648 | 0.000 | 0.000 | -9.303 | -2.725 |
| GLASS CONDUCTION | 6.362 | 1.863 | 0.000 | 0.000 | -20.388 | -5.971 |
| GLASS SOLAR | 45.792 | 13.411 | 0.000 | 0.000 | 2.552 | 0.747 |
| DOOR | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| INTERNAL SURFACES | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| UNDERGROUND SURFACES | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| OCCUPANTS TO SPACE | 13.427 | 3.932 | 15.800 | 4.627 | 14.676 | 4.298 |
| LIGHT TO SPACE | 100.859 | 29.539 | 0.000 | 0.000 | 57.020 | 16.700 |
| EQUIPMENT TO SPACE | 45.914 | 13.447 | 0.000 | 0.000 | 11.068 | 3.241 |
| PROCESS TO SPACE | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| INFILTRATION | 75.785 | 22.196 | 59.055 | 17.296 | -399.978 | -117.144 |
| TOTAL | 315.056 | 92.272 | 74.855 | 21.923 | -362.760 | -106.243 |
| TOTAL LOAD | 389.911 KBTU/H | | 114.195 KW | | -362.760 KBTU/H | -106.243 KW |
| TOTAL LOAD / AREA | 20.27BTU/H.SQFT | | 63.887 W /SQMT | | 18.854BTU/H.SQFT | 59.438 W /SQMT |

```
*****************************************************************
*                                                               *
*  NOTE  1)THE ABOVE LOADS EXCLUDE OUTSIDE VENTILATION AIR      *
*  ----    LOADS                                                *
*        2)TIMES GIVEN IN STANDARD TIME FOR THE LOCATION        *
*          IN CONSIDERATION                                     *
*                                                               *
*****************************************************************
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RAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 LDL RUN 1
BUILDING 1242 BASE CASE PRESENT ENERGY USAGE
REPORT- LS-D BUILDING MONTHLY LOADS SUMMARY WEATHER FILE- TMY RALEIGH, NC

| | - - - - - - - - C O O L I N G - - - - - - - - | | | | | | - - - - - - - - H E A T I N G - - - - - - - - | | | | | | - - - E L E C - - - | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | COOLING ENERGY (MBTU) | TIME OF DY | TIME MAX HR | DRY-BULB TEMP | WET-BULB TEMP | MAXIMUM COOLING LOAD (KBTU/HR) | HEATING ENERGY (MBTU) | TIME OF DY | TIME MAX HR | DRY-BULB TEMP | WET-BULB TEMP | MAXIMUM HEATING LOAD (KBTU/HR) | ELEC-TRICAL ENERGY (KWH) | MAXIMUM ELEC LOAD (KW) |
| JAN | 12.83082 | 25 | 20 | 50.F | 38.F | 142.039 | -54.164 | 21 | 24 | 36.F | 33.F | -362.760 | 21507. | 65.333 |
| FEB | 14.62866 | 25 | 22 | 49.F | 41.F | 142.484 | -39.741 | 9 | 10 | 23.F | 20.F | -352.038 | 19426. | 65.333 |
| MAR | 25.94331 | 1 | 22 | 58.F | 54.F | 153.449 | -21.508 | 25 | 4 | 38.F | 32.F | -188.687 | 21529. | 65.333 |
| APR | 58.94000 | 27 | 17 | 80.F | 60.F | 251.750 | -3.267 | 20 | 5 | 43.F | 39.F | -101.945 | 20821. | 65.333 |
| MAY | 93.93642 | 31 | 17 | 86.F | 68.F | 315.056 | -1.900 | 6 | 15 | 50.F | 49.F | -120.690 | 21507. | 65.333 |
| JUN | 111.56142 | 28 | 18 | 90.F | 77.F | 298.711 | -0.011 | 5 | 5 | 60.F | 57.F | -1.784 | 20832. | 65.333 |
| | 123.11762 | 28 | 17 | 90.F | 71.F | 292.342 | 0.000 | | | | | 0.000 | 21495. | 65.333 |
| AUG | 121.45340 | 31 | 17 | 87.F | 70.F | 301.112 | 0.000 | 28 | 5 | 59.F | 58.F | -0.020 | 21529. | 65.333 |
| SEP | 98.11981 | 6 | 17 | 95.F | 75.F | 307.081 | -0.048 | 25 | 7 | 58.F | 56.F | -4.145 | 20821. | 65.333 |
| OCT | 59.82496 | 3 | 18 | 77.F | 66.F | 217.565 | -3.864 | 18 | 14 | 50.F | 47.F | -91.125 | 21495. | 65.333 |
| NOV | 25.38949 | 4 | 22 | 73.F | 62.F | 179.187 | -27.545 | 18 | 3 | 23.F | 20.F | -247.330 | 20809. | 65.333 |
| DEC | 14.31244 | 2 | 21 | 51.F | 45.F | 161.359 | -38.264 | 21 | 10 | 25.F | 22.F | -222.312 | 21507. | 65.333 |
| TOTAL | 760.058 | | | | | | -190.310 | | | | | | 253279. | |
| MAX | | | | | | 315.056 | | | | | | -362.760 | | 65.333 |

MESSAGE LIST FROM SYSTEMS PROGRAM

**WARNING**********
SYSTEM BATHSYS HAS ZERO OUTSIDE AIR FOR DESIGN CALCULATION

**WARNING**********
SYSTEM BATHSYS MAY HAVE INADEQUATE HEATING CAPABILIT Y
(CHECK HEATING-CAPACITY,HEAT-SET-T,PRE-HEAT-T AND MAX-SUPPLY-T FOR CONSISTENCY)

FT BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
DING 1242 BASE CASE PRESENT ENERGY USAGE
ORT- SV-A SYSTEM DESIGN PARAMETERS KITCHENSYS WEATHER FILE- TMY RALEIGH, NC

| SYSTEM NAME | ALTITUDE MULTIPLIER |
|---|---|
| KITCHENSYS | 1.000 |

| SUPPLY FAN (CFM ) | ELEC (KW) | DELTA-T (F) | RETURN FAN (CFM ) | ELEC (KW) | DELTA-T (F) | OUTSIDE AIR RATIO | COOLING CAPACITY (KBTU/HR) | SENSIBLE (SHR) | HEATING CAPACITY (KBTU/HR) | COOLING EIR (BTU/BTU) | HEATING EIR (BTU/BTU) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1370. | 1.073 | 2.4 | 0. | 0.000 | 0.0 | 1.000 | 73.514 | 0.602 | -112.579 | 0.00 | 0.00 |

| ZONE NAME | SUPPLY FLOW | EXHAUST FLOW | FAN (KW) | MINIMUM FLOW RATIO | OUTSIDE AIR FLOW | COOLING CAPACITY (KBTU/HR) | SENSIBLE (SHR) | EXTRACTION RATE (KBTU/HR) | HEATING CAPACITY (KBTU/HR) | ADDITION RATE (KBTU/HR) | MULTIPLIER |
|---|---|---|---|---|---|---|---|---|---|---|---|
| KITCHEN | 1370. | 0. | 0.000 | 1.000 | 1370. | 0.00 | 0.00 | 38.47 | 0.00 | -71.02 | 1.0 |

FT[redacted]GG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
BU[redacted]NG 1242 BASE CASE PRESENT ENERGY USAGE
REPORT- SV-A SYSTEM DESIGN PARAMETERS BUILDING WEATHER FILE- TMY RALEIGH, NC

| SYSTEM NAME | ALTITUDE MULTIPLIER |
|---|---|
| BUILDING | 1.000 |

| SUPPLY FAN (CFM ) | ELEC (KW) | DELTA-T (F) | RETURN FAN (CFM ) | ELEC (KW) | DELTA-T (F) | OUTSIDE AIR RATIO | COOLING CAPACITY (KBTU/HR) | SENSIBLE (SHR) | HEATING CAPACITY (KBTU/HR) | COOLING EIR (BTU/BTU) | HEATING EIR (BTU/BTU) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 11568. | 9.058 | 2.4 | 0. | 0.000 | 0.0 | 0.240 | 595.126 | 0.596 | -685.171 | 0.00 | 0.00 |

| ZONE NAME | SUPPLY FLOW | EXHAUST FLOW | FAN (KW) | MINIMUM FLOW RATIO | OUTSIDE AIR FLOW | COOLING CAPACITY (KBTU/HR) | SENSIBLE (SHR) | EXTRACTION RATE (KBTU/HR) | HEATING CAPACITY (KBTU/HR) | ADDITION RATE (KBTU/HR) | MULTIPLIER |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FIRSTFL | 1800. | 0. | 0.000 | 1.000 | 360. | 0.00 | 0.00 | 50.54 | 0.00 | -93.31 | 1.0 |
| SECONDFL | 4539. | 0. | 0.000 | 1.000 | 908. | 0.00 | 0.00 | 127.46 | 0.00 | -235.30 | 1.0 |
| THIRDFL | 4539. | 0. | 0.000 | 1.000 | 908. | 0.00 | 0.00 | 127.46 | 0.00 | -235.30 | 1.0 |
| SFBATH | 310. | 300. | 0.000 | 1.000 | 300. | 0.00 | 0.00 | 8.70 | 0.00 | -46.07 | 1.0 |
| T[redacted]H | 380. | 300. | 0.000 | 1.000 | 300. | 0.00 | 0.00 | 10.67 | 0.00 | -49.70 | 1.0 |

RAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
LDING 1242 BASE CASE PRESENT ENERGY USAGE
REPORT- SV-A SYSTEM DESIGN PARAMETERS BATHSYS WEATHER FILE- TMY RALEIGH, NC

| SYSTEM NAME | ALTITUDE MULTIPLIER |
|---|---|
| BATHSYS | 1.000 |

| SUPPLY FAN (CFM ) | ELEC (KW) | DELTA-T (F) | RETURN FAN (CFM ) | ELEC (KW) | DELTA-T (F) | OUTSIDE AIR RATIO | COOLING CAPACITY (KBTU/HR) | SENSIBLE (SHR) | HEATING CAPACITY (KBTU/HR) | COOLING EIR (BTU/BTU) | HEATING EIR (BTU/BTU) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 960. | 0.751 | 2.4 | 0. | 0.000 | 0.0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 |

| ZONE NAME | SUPPLY FLOW | EXHAUST FLOW | FAN (KW) | MINIMUM FLOW RATIO | OUTSIDE AIR FLOW | COOLING CAPACITY (KBTU/HR) | SENSIBLE (SHR) | EXTRACTION RATE (KBTU/HR) | HEATING CAPACITY (KBTU/HR) | ADDITION RATE (KBTU/HR) | MULTIPLIER |
|---|---|---|---|---|---|---|---|---|---|---|---|
| KITCHEN | 960. | 0. | 0.000 | 1.000 | 0. | 0.00 | 0.00 | 0.00 | 0.00 | -49.77 | 1.0 |

FT BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
BUILDING 1242 BASE CASE PRESENT ENERGY USAGE
REPORT- SS-D PLANT MONTHLY LOADS SUMMARY FOR DEFAULT-PLANT WEATHER FILE- TMY RALEIGH, NC

| | COOLING | | | | | | HEATING | | | | | | ELEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | COOLING ENERGY (MBTU) | TIME OF MAX DY | TIME OF MAX HR | DRY-BULB TEMP | WET-BULB TEMP | MAXIMUM COOLING LOAD (KBTU/HR) | HEATING ENERGY (MBTU) | TIME OF MAX DY | TIME OF MAX HR | DRY-BULB TEMP | WET-BULB TEMP | MAXIMUM HEATING LOAD (KBTU/HR) | ELEC-TRICAL ENERGY (KWH) | MAXIMUM ELEC LOAD (KW) |
| JAN | 0.00000 | | | | | 0.000 | -147.642 | 16 | 10 | 14.F | 13.F | -571.249 | 32250. | 83.971 |
| FEB | 0.00000 | | | | | 0.000 | -115.381 | 9 | 10 | 23.F | 20.F | -534.679 | 29129. | 83.971 |
| MAR | 0.00000 | | | | | 0.000 | -74.137 | 25 | 4 | 38.F | 32.F | -314.203 | 32250. | 83.971 |
| APR | 7.65921 | 27 | 17 | 82.F | 62.F | 280.448 | -5.872 | 1 | 5 | 32.F | 29.F | -167.558 | 31210. | 83.971 |
| MAY | 67.04546 | 31 | 16 | 86.F | 70.F | 497.440 | 0.000 | | | | | 0.000 | 32250. | 83.971 |
| JUN | 128.03651 | 27 | 14 | 88.F | 78.F | 612.669 | 0.000 | | | | | 0.000 | 31210. | 83.971 |
| JUL | 160.96661 | 29 | 17 | 85.F | 74.F | 554.171 | 0.000 | | | | | 0.000 | 32250. | 83.971 |
| AUG | 165.80756 | 11 | 17 | 83.F | 76.F | 584.444 | 0.000 | | | | | 0.000 | 32250. | 83.971 |
| SEP | 92.40501 | 7 | 15 | 92.F | 77.F | 563.434 | 0.000 | | | | | 0.000 | 31210. | 83.971 |
| OCT | 19.83142 | 7 | 17 | 73.F | 71.F | 467.077 | -19.371 | 16 | 2 | 46.F | 44.F | -270.082 | 32250. | 83.971 |
| NOV | 0.00000 | | | | | 0.000 | -84.618 | 18 | 3 | 23.F | 20.F | -438.890 | 31210. | 83.971 |
| DEC | 0.00000 | | | | | 0.000 | -117.061 | 11 | 6 | 18.F | 16.F | -406.015 | 32250. | 83.971 |
| TOTAL | 641.751 | | | | | | -564.081 | | | | | | 379719. | |
| MAX | | | | | | 612.669 | | | | | | -571.249 | | 83.971 |

[redacted]AGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
[redacted]ING 1242 BASE CASE PRESENT ENERGY USAGE
REPORT- SS-M FAN ELECTRIC ENERGY FOR PLANT DEFAULT-PLANT WEATHER FILE- TMY RALEIGH, NC

| MONTH | FAN ELECTRIC ENERGY DURING HEATING (KWH) | FAN ELECTRIC ENERGY DURING COOLING (KWH) | FAN ELECTRIC ENERGY DURING HEATING-COOLING (KWH) | FAN ELECTRIC ENERGY DURING FLOATING (KWH) |
|---|---|---|---|---|
| JAN | 7641.068 | 0.000 | 0.000 | 454.851 |
| FEB | 6821.378 | 0.000 | 0.000 | 491.081 |
| MAR | 6885.142 | 0.000 | 0.000 | 1210.794 |
| APR | 1588.172 | 742.024 | 0.000 | 5504.583 |
| MAY | 0.000 | 3934.708 | 0.000 | 4161.304 |
| JUN | 0.000 | 5740.780 | 0.000 | 2094.037 |
| JUL | 0.000 | 6646.198 | 0.000 | 1449.760 |
| [redacted] | 0.000 | 6872.043 | 0.000 | 1223.902 |
| SEP | 0.000 | 4776.846 | 0.000 | 3057.988 |
| OCT | 2796.213 | 1289.430 | 0.000 | 4010.355 |
| NOV | 6607.783 | 0.000 | 0.000 | 1227.000 |
| DEC | 7502.512 | 0.000 | 0.000 | 593.413 |
| ANNUAL | 39844.121 | 30001.867 | 0.000 | 25480.416 |

FT BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
BUILDING 1242 BASE CASE PRESENT ENERGY USAGE
REPORT- SS-A SYSTEM MONTHLY LOADS SUMMARY FOR KITCHENSYS WEATHER FILE- TMY RALEIGH, NC

| | COOLING | | | | | | HEATING | | | | | | ELEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | COOLING ENERGY (MBTU) | TIME OF MAX DY | TIME OF MAX HR | DRY-BULB TEMP | WET-BULB TEMP | MAXIMUM COOLING LOAD (KBTU/HR) | HEATING ENERGY (MBTU) | TIME OF MAX DY | TIME OF MAX HR | DRY-BULB TEMP | WET-BULB TEMP | MAXIMUM HEATING LOAD (KBTU/HR) | ELEC-TRICAL ENERGY (KWH) | MAXIMUM ELEC LOAD (KW) |
| JAN | 0.00000 | | | | | 0.000 | -45.897 | 5 | 9 | 8.F | 6.F | -138.525 | 3446. | 8.829 |
| FEB | 0.00000 | | | | | 0.000 | -37.608 | 9 | 10 | 23.F | 20.F | -120.038 | 3112. | 8.829 |
| MAR | 0.00000 | | | | | 0.000 | -27.899 | 9 | 5 | 28.F | 24.F | -84.129 | 3423. | 8.829 |
| APR | 0.58749 | 17 | 16 | 82.F | 65.F | 27.602 | -3.499 | 1 | 5 | 32.F | 29.F | -60.993 | 3327. | 8.829 |
| MAY | 9.12778 | 24 | 18 | 87.F | 70.F | 71.554 | 0.000 | | | | | 0.000 | 3446. | 8.829 |
| JUN | 23.24629 | 28 | 18 | 90.F | 78.F | 117.483 | 0.000 | | | | | 0.000 | 3316. | 8.829 |
| JUL | 33.57294 | 23 | 17 | 91.F | 77.F | 106.555 | 0.000 | | | | | 0.000 | 3457. | 8.829 |
| AUG | 30.45890 | 10 | 21 | 82.F | 76.F | 99.977 | 0.000 | | | | | 0.000 | 3423. | 8.829 |
| SEP | 17.39029 | 6 | 18 | 95.F | 75.F | 106.330 | 0.000 | | | | | 0.000 | 3327. | 8.829 |
| OCT | 2.24276 | 1 | 16 | 82.F | 71.F | 48.360 | -9.221 | 16 | 2 | 46.F | 44.F | -86.522 | 3457. | 8.829 |
| NOV | 0.00000 | | | | | 0.000 | -29.497 | 18 | 3 | 23.F | 20.F | -107.401 | 3338. | 8.829 |
| DEC | 0.00000 | | | | | 0.000 | -38.812 | 22 | 5 | 16.F | 15.F | -108.456 | 3446. | 8.829 |
| TOTAL | 116.626 | | | | | | -192.432 | | | | | | 40515. | |
| MAX | | | | | | 117.483 | | | | | | -138.525 | | 8.829 |

[redacted]AGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
[redacted]DING 1242 BASE CASE PRESENT ENERGY USAGE
REPORT- SS-B SYSTEM MONTHLY LOADS SUMMARY FOR KITCHENSYS WEATHER FILE- TMY RALEIGH, NC

| | - -Z O N E C O O L I N G- - | | - -Z O N E H E A T I N G - | | - - B A S E B O A R D S - - | | - - - -P R E - H E A T - - - | |
|---|---|---|---|---|---|---|---|---|
| MONTH | ZONE COIL COOLING ENERGY (MBTU) | MAXIMUM ZONE COIL COOLING LOAD (KBTU/HR) | ZONE COIL HEATING ENERGY (MBTU) | MAXIMUM ZONE COIL HEATING LOAD (KBTU/HR) | BASEBOARD HEATING ENERGY (MBTU) | MAXIMUM BASEBOARD HEATING LOAD (KBTU/HR) | PRE-HEAT COIL ENERGY (MBTU) | MAXIMUM PRE-HEAT COIL LOAD (KBTU/HR) |
| JAN | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | -11.67391 | -58.123 |
| FEB | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | -7.72842 | -47.259 |
| MAR | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | -2.81301 | -33.207 |
| APR | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | -0.15786 | -19.759 |
| MAY | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 |
| [redacted] | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 |
| JUL | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 |
| AUG | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 |
| SEP | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 |
| OCT | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | -0.35754 | -16.664 |
| NOV | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | -5.01541 | -41.167 |
| DEC | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | -7.29512 | -43.914 |
| TOTAL | 0.000 | | 0.000 | | 0.000 | | -35.041 | |
| MAX | | 0.000 | | 0.000 | | 0.000 | | -58.123 |

FT BRAGG ENERGY STUDY — HISTORIC RED BRICK BLDG AREA — DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
BUILDING 1242 — BASE CASE — PRESENT ENERGY USAGE
REPORT- SS-I SYSTEM MONTHLY SOURCE-LATENT SUMMARY FOR KITCHENSYS — WEATHER FILE- TMY RALEIGH, NC

| MONTH | SENSIBLE COOLING ENERGY (MBTU) | LATENT COOLING ENERGY (MBTU) | MAX TOTAL COOLING ENERGY (KBTU/HR) | SENSIBLE HEAT RATIO AT MAX | TIME OF MAX DY | TIME OF MAX HR | SENSIBLE HEATING ENERGY (MBTU) | LATENT HEATING ENERGY (MBTU) | MAX TOTAL HEATING ENERGY (KBTU/HR) |
|---|---|---|---|---|---|---|---|---|---|
| JAN | 0.00000 | 0.00000 | 0.000 | | | | -45.89718 | 0.00000 | -138.52534 |
| FEB | 0.00000 | 0.00000 | 0.000 | | | | -37.60761 | 0.00000 | -120.03767 |
| MAR | 0.00000 | 0.00000 | 0.000 | | | | -27.89878 | 0.00000 | -84.12926 |
| APR | 0.58749 | 0.00000 | 27.602 | 1.000 | 17 | 16 | -3.49870 | 0.00000 | -60.993 |
| MAY | 7.49865 | 1.62913 | 71.554 | 0.612 | 24 | 18 | 0.00000 | 0.00000 | 0.000 |
| JUN | 13.35683 | 9.88946 | 117.483 | 0.474 | 28 | 18 | 0.00000 | 0.00000 | 0.000 |
| JUL | 17.37413 | 16.19881 | 106.555 | 0.473 | 23 | 17 | 0.00000 | 0.00000 | 0.000 |
| AUG | 16.92943 | 13.52946 | 99.977 | 0.420 | 10 | 21 | 0.00000 | 0.00000 | 0.000 |
| SEP | 10.37347 | 7.01682 | 106.330 | 0.530 | 6 | 18 | 0.00000 | 0.00000 | 0.000 |
| OCT | 1.78436 | 0.45840 | 48.360 | 0.405 | 1 | 16 | -9.22082 | 0.00000 | -86.522 |
| NOV | 0.00000 | 0.00000 | 0.000 | | | | -29.49663 | 0.00000 | -107.40079 |
| DEC | 0.00000 | 0.00000 | 0.000 | | | | -38.81244 | 0.00000 | -108.45625 |
| TOTAL | 67.904 | 48.722 | | | | | -192.432 | 0.000 | |
| MAX | | | 117.483 | 0.474 | | | | | -138.525 |

FT BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
BUILDING 1242 BASE CASE PRESENT ENERGY USAGE
REPORT- SS-J SYSTEM PEAK HEATING AND COOLING DAYS FOR KITCHENSYS WEATHER FILE- TMY RALEIGH, NC

| | - - - - - COOLING - - - - - | | | | - - - HEATING - - - | | |
|---|---|---|---|---|---|---|---|
| | JUN 28 | | | | JAN 5 | | |
| HOUR | HOURLY COOLING LOAD (KBTU) | SENSIBLE HEAT RATIO | DRY-BULB TEMP | WET-BULB TEMP | HOURLY HEATING LOAD (KBTU) | DRY-BULB TEMP | WET-BULB TEMP |
| 1 | 54.816 | 0.402 | 76.F | 73.F | -115.078 | 12.F | 11.F |
| 2 | 47.449 | 0.415 | 75.F | 72.F | -116.910 | 13.F | 11.F |
| 3 | 45.300 | 0.385 | 74.F | 72.F | -117.034 | 12.F | 10.F |
| 4 | 37.975 | 0.399 | 73.F | 71.F | -130.903 | 11.F | 9.F |
| 5 | 60.498 | 0.392 | 73.F | 71.F | -133.020 | 9.F | 7.F |
| 6 | 58.845 | 0.414 | 74.F | 71.F | -118.029 | 8.F | 6.F |
| 7 | 38.647 | 0.437 | 74.F | 71.F | -120.947 | 7.F | 5.F |
| 8 | 48.688 | 0.433 | 77.F | 73.F | -127.280 | 7.F | 5.F |
| 9 | 53.845 | 0.494 | 81.F | 74.F | -138.525 | 8.F | 6.F |
| 10 | 60.687 | 0.515 | 84.F | 75.F | -120.875 | 11.F | 8.F |
| 11 | 63.541 | 0.550 | 86.F | 75.F | -117.367 | 13.F | 10.F |
| 12 | 65.900 | 0.584 | 88.F | 75.F | -117.180 | 16.F | 12.F |
| 13 | 70.420 | 0.605 | 90.F | 75.F | -110.289 | 15.F | 12.F |
| 14 | 77.420 | 0.560 | 90.F | 76.F | -107.214 | 18.F | 14.F |
| 15 | 84.222 | 0.524 | 90.F | 77.F | -110.484 | 20.F | 16.F |
| 16 | 91.720 | 0.490 | 90.F | 78.F | -106.651 | 23.F | 17.F |
| 17 | 117.483 | 0.474 | 90.F | 78.F | -102.321 | 23.F | 17.F |
| 18 | 112.332 | 0.494 | 90.F | 77.F | -97.009 | 20.F | 15.F |
| 19 | 112.822 | 0.494 | 90.F | 77.F | -98.199 | 19.F | 15.F |
| 20 | 106.213 | 0.483 | 87.F | 76.F | -105.296 | 15.F | 12.F |
| 21 | 100.130 | 0.456 | 83.F | 75.F | -101.991 | 15.F | 12.F |
| 22 | 71.002 | 0.443 | 80.F | 74.F | -103.491 | 14.F | 11.F |
| 23 | 62.576 | 0.440 | 78.F | 73.F | -116.582 | 13.F | 10.F |
| 24 | 54.351 | 0.457 | 77.F | 72.F | -115.155 | 11.F | 9.F |
| MAX | 117.483 | | | | -138.525 | | |

[redacted]RAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
[redacted]ING 1242 BASE CASE PRESENT ENERGY USAGE
REPORT- SS-K SPACE TEMPERATURE SUMMARY KITCHENSYS WEATHER FILE- TMY RALEIGH, NC

| | AVERAGE SPACE TEMP | | | | | AVERAGE TEMPERATURE DIFFERENCE BETWEEN OUTDOOR& ROOM AIR | | | SUMMED TEMP DIFFERENCE BETWEEN OUTDOOR& ROOM AIR | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | ALL HOURS (F) | COOLING HOURS (F) | HEATING HOURS (F) | FAN ON HOURS (F) | FAN OFF HOURS (F) | ALL HOURS (F) | FAN ON HOURS (F) | FAN OFF HOURS (F) | HEATING HOURS (F) | ALL HOURS (F) | HUMIDITY RATIO DIFFERENCE BETWEEN OUTDOOR AND ROOM AIR (PERCENT-RH ) |
| JAN | 74.19 | | 74.19 | 74.19 | 0.00 | -37.00 | -37.00 | 0.00 | 1146.97 | 1146.97 | -0.00025 |
| FEB | 74.22 | | 74.22 | 74.22 | 0.00 | -34.78 | -34.78 | 0.00 | 973.96 | 973.96 | -0.00026 |
| MAR | 74.44 | | 74.37 | 74.44 | 0.00 | -26.34 | -26.34 | 0.00 | 808.32 | 816.54 | -0.00025 |
| APR | 71.83 | 75.64 | 74.71 | 71.83 | 0.00 | -12.10 | -12.10 | 0.00 | 166.00 | 371.51 | -0.00026 |
| MAY | 73.29 | 75.91 | | 73.29 | 0.00 | -5.31 | -5.31 | 0.00 | | 229.60 | 0.00002 |
| JUN | 75.82 | 76.10 | | 75.82 | 0.00 | -1.94 | -1.94 | 0.00 | | 189.87 | 0.00163 |
| [redacted] | 76.22 | 76.23 | | 76.22 | 0.00 | 0.27 | 0.27 | 0.00 | | 167.54 | 0.00271 |
| AUG | 76.19 | 76.21 | | 76.19 | 0.00 | 0.12 | 0.12 | 0.00 | | 163.60 | 0.00228 |
| SEP | 75.47 | 76.00 | | 75.47 | 0.00 | -3.45 | -3.45 | 0.00 | | 209.43 | 0.00109 |
| OCT | 73.56 | 75.70 | 74.48 | 73.56 | 0.00 | -14.93 | -14.93 | 0.00 | 305.81 | 472.75 | -0.00019 |
| NOV | 74.54 | | 74.35 | 74.54 | 0.00 | -28.10 | -28.10 | 0.00 | 828.84 | 842.96 | -0.00026 |
| DEC | 74.25 | | 74.25 | 74.25 | 0.00 | -32.99 | -32.99 | 0.00 | 1022.78 | 1022.78 | -0.00026 |
| ANNUAL | 74.51 | 76.09 | 74.32 | 74.51 | 0.00 | -16.28 | -16.28 | 0.00 | 5252.69 | 6607.51 | 0.00051 |

FT BRAGG ENERGY STUDY — HISTORIC RED BRICK BLDG AREA — DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
BUILDING 1242 — BASE CASE — PRESENT ENERGY USAGE
REPORT- SS-L FAN ELECTRIC ENERGY — KITCHENSYS — WEATHER FILE- TMY RALEIGH, NC

| MONTH | FAN ELECTRIC ENERGY DURING HEATING (KWH) | FAN ELECTRIC ENERGY DURING COOLING (KWH) | FAN ELECTRIC ENERGY DURING HEATING-COOLING (KWH) | FAN ELECTRIC ENERGY DURING FLOATING (KWH) |
|---|---|---|---|---|
| JAN | 798.094 | 0.000 | 0.000 | 0.000 |
| FEB | 720.861 | 0.000 | 0.000 | 0.000 |
| MAR | 768.059 | 0.000 | 0.000 | 30.036 |
| APR | 240.287 | 53.635 | 0.000 | 478.431 |
| MAY | 0.000 | 465.558 | 0.000 | 332.541 |
| JUN | 0.000 | 686.534 | 0.000 | 85.817 |
| JUL | 0.000 | 794.876 | 0.000 | 3.218 |
| AUG | 0.000 | 785.222 | 0.000 | 12.873 |
| SEP | 0.000 | 592.137 | 0.000 | 180.215 |
| OCT | 338.977 | 166.270 | 0.000 | 292.850 |
| NOV | 724.079 | 0.000 | 0.000 | 48.272 |
| DEC | 798.094 | 0.000 | 0.000 | 0.000 |
| ANNUAL | 4388.589 | 3544.332 | 0.000 | 1464.262 |

[redacted]AGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
[redacted]ING 1242 BASE CASE PRESENT ENERGY USAGE
REPORT- SS-G ZONE LOADS SUMMARY IN KITCHENSYS FOR KITCHEN WEATHER FILE- TMY RALEIGH, NC

| | - - - - - - - - COOLING - - - - - - - - | | | | | - - - - - - - - HEATING - - - - - - - - | | | | | - - - ELEC - - - | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | COOLING ENERGY (MBTU) | TIME OF MAX DY HR | DRY-BULB TEMP | WET-BULB TEMP | MAXIMUM COOLING LOAD (KBTU/HR) | HEATING ENERGY (MBTU) | TIME OF MAX DY HR | DRY-BULB TEMP | WET-BULB TEMP | MAXIMUM HEATING LOAD (KBTU/HR) | ELEC-TRICAL ENERGY (KWH) | MAXIMUM ELEC LOAD (KW) |
| JAN | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2648. | 7.757 |
| FEB | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2391. | 7.757 |
| MAR | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2625. | 7.757 |
| APR | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2554. | 7.757 |
| MAY | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2648. | 7.757 |
| JUN | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2543. | 7.757 |
| [redacted] | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2659. | 7.757 |
| AUG | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2625. | 7.757 |
| SEP | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2554. | 7.757 |
| OCT | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2659. | 7.757 |
| NOV | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2566. | 7.757 |
| DEC | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2648. | 7.757 |
| TOTAL | 0.000 | | | | | 0.000 | | | | | 31120. | |
| MAX | | | | | 0.000 | | | | | 0.000 | | 7.757 |

[redacted] BRAGG ENERGY STUDY — HISTORIC RED BRICK BLDG AREA — DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
[redacted]ING 1242 — BASE CASE — PRESENT ENERGY USAGE
REPORT- SS-F ZONE DEMAND SUMMARY IN KITCHENSYS FOR KITCHEN — WEATHER FILE- TMY RALEIGH, NC

| | - - - -D E M A N D S- - - - - | | - -B A S E B O A R D S- - - | | - -T E M P E R A T U R E S- - | | - -L O A D S N O T M E T- - | |
|---|---|---|---|---|---|---|---|---|
| MONTH | HEAT EXTRACTION ENERGY (MBTU) | HEAT ADDITION ENERGY (MBTU) | BASEBOARD ENERGY (MBTU) | MAXIMUM BASEBOARD LOAD (KBTU/HR) | MAXIMUM ZONE TEMP (F) | MINIMUM ZONE TEMP (F) | HOURS UNDER HEATED | HOURS UNDER COOLED |
| JAN | 0.81322 | -7.901 | 0.00000 | 0.000 | 75.0 | 73.4 | 0 | 0 |
| FEB | 1.10559 | -5.921 | 0.00000 | 0.000 | 74.8 | 73.4 | 0 | 0 |
| MAR | 1.97935 | -3.298 | 0.00000 | 0.000 | 78.1 | 73.8 | 0 | 0 |
| APR | 7.60275 | -0.267 | 0.00000 | 0.000 | 81.3 | 57.9 | 5 | 0 |
| MAY | 10.70360 | -0.116 | 0.00000 | 0.000 | 76.9 | 55.5 | 6 | 0 |
| JUN | 12.57390 | 0.000 | 0.00000 | 0.000 | 77.2 | 70.9 | 0 | 0 |
| [redacted] | 14.04586 | 0.000 | 0.00000 | 0.000 | 77.0 | 74.6 | 0 | 0 |
| AUG | 13.83191 | 0.000 | 0.00000 | 0.000 | 76.9 | 74.2 | 0 | 0 |
| SEP | 11.27449 | -0.008 | 0.00000 | 0.000 | 77.0 | 69.3 | 0 | 0 |
| OCT | 7.28792 | -0.970 | 0.00000 | 0.000 | 80.0 | 59.4 | 6 | 0 |
| NOV | 2.10351 | -3.815 | 0.00000 | 0.000 | 79.4 | 73.7 | 0 | 0 |
| DEC | 0.95992 | -5.595 | 0.00000 | 0.000 | 75.0 | 73.7 | 0 | 0 |

RAGG ENERGY STUDY — HISTORIC RED BRICK BLDG AREA — DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
DING 1242 — BASE CASE — PRESENT ENERGY USAGE
REPORT- SS-A SYSTEM MONTHLY LOADS SUMMARY FOR BUILDING — WEATHER FILE- TMY RALEIGH, NC

| | COOLING | | | | | | HEATING | | | | | | ELEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | COOLING ENERGY (MBTU) | TIME OF MAX DY | TIME OF MAX HR | DRY-BULB TEMP | WET-BULB TEMP | MAXIMUM COOLING LOAD (KBTU/HR) | HEATING ENERGY (MBTU) | TIME OF MAX DY | TIME OF MAX HR | DRY-BULB TEMP | WET-BULB TEMP | MAXIMUM HEATING LOAD (KBTU/HR) | ELEC-TRICAL ENERGY (KWH) | MAXIMUM ELEC LOAD (KW) |
| JAN | 0.00000 | | | | | 0.000 | -101.666 | 16 | 10 | 14.F | 13.F | -441.832 | 25598. | 66.634 |
| FEB | 0.00000 | | | | | 0.000 | -77.727 | 9 | 10 | 23.F | 20.F | -414.119 | 23122. | 66.634 |
| MAR | 0.00000 | | | | | 0.000 | -46.192 | 25 | 4 | 38.F | 32.F | -237.854 | 25644. | 66.634 |
| APR | 7.07172 | 27 | 17 | 82.F | 62.F | 265.983 | -2.355 | 1 | 6 | 32.F | 29.F | -109.237 | 24788. | 66.634 |
| MAY | 57.91773 | 31 | 16 | 86.F | 70.F | 448.060 | 0.000 | | | | | 0.000 | 25598. | 66.634 |
| JUN | 104.79026 | 27 | 14 | 88.F | 78.F | 524.310 | 0.000 | | | | | 0.000 | 24810. | 66.634 |
| | 127.39361 | 29 | 17 | 85.F | 74.F | 486.248 | 0.000 | | | | | 0.000 | 25576. | 66.634 |
| AUG | 135.34880 | 2 | 12 | 75.F | 73.F | 520.993 | 0.000 | | | | | 0.000 | 25644. | 66.634 |
| SEP | 75.01471 | 7 | 15 | 92.F | 77.F | 481.526 | 0.000 | | | | | 0.000 | 24788. | 66.634 |
| OCT | 17.58866 | 7 | 17 | 73.F | 71.F | 449.077 | -10.107 | 16 | 2 | 46.F | 44.F | -183.085 | 25576. | 66.634 |
| NOV | 0.00000 | | | | | 0.000 | -55.047 | 18 | 3 | 23.F | 20.F | -331.120 | 24765. | 66.634 |
| DEC | 0.00000 | | | | | 0.000 | -78.207 | 11 | 2 | 24.F | 21.F | -306.934 | 25598. | 66.634 |
| TOTAL | 525.125 | | | | | | -371.301 | | | | | | 301503. | |
| MAX | | | | | | 524.310 | | | | | | -441.832 | | 66.634 |

FT BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
BUILDING 1242 BASE CASE PRESENT ENERGY USAGE
REPORT- SS-B SYSTEM MONTHLY LOADS SUMMARY FOR BUILDING WEATHER FILE- TMY RALEIGH, NC

| | --ZONE COOLING-- | | --ZONE HEATING- | | --BASEBOARDS-- | | ----PRE-HEAT--- | |
|---|---|---|---|---|---|---|---|---|
| MONTH | ZONE COIL COOLING ENERGY (MBTU) | MAXIMUM ZONE COIL COOLING LOAD (KBTU/HR) | ZONE COIL HEATING ENERGY (MBTU) | MAXIMUM ZONE COIL HEATING LOAD (KBTU/HR) | BASEBOARD HEATING ENERGY (MBTU) | MAXIMUM BASEBOARD HEATING LOAD (KBTU/HR) | PRE-HEAT COIL ENERGY (MBTU) | MAXIMUM PRE-HEAT COIL LOAD (KBTU/HR) |
| JAN | 0.00000 | 0.000 | 0.00000 | 0.000 | -4.74970 | -25.693 | 0.00000 | 0.000 |
| FEB | 0.00000 | 0.000 | 0.00000 | 0.000 | -3.99337 | -25.736 | 0.00000 | 0.000 |
| MAR | 0.00000 | 0.000 | 0.00000 | 0.000 | -3.32493 | -17.630 | 0.00000 | 0.000 |
| APR | 0.00000 | 0.000 | 0.00000 | 0.000 | -0.50709 | -12.084 | 0.00000 | 0.000 |
| MAY | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 |
| JUN | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 |
| JUL | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 |
| AUG | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 |
| SEP | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 |
| OCT | 0.00000 | 0.000 | 0.00000 | 0.000 | -0.73569 | -15.609 | 0.00000 | 0.000 |
| NOV | 0.00000 | 0.000 | 0.00000 | 0.000 | -3.07612 | -22.039 | 0.00000 | 0.000 |
| DEC | 0.00000 | 0.000 | 0.00000 | 0.000 | -4.15178 | -19.796 | 0.00000 | 0.000 |
| TOTAL | 0.000 | | 0.000 | | -20.539 | | 0.000 | |
| MAX | | 0.000 | | 0.000 | | -25.736 | | 0.000 |

FT [redacted]AGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
B[redacted]NG 1242 BASE CASE PRESENT ENERGY USAGE
REPORT- SS-I SYSTEM MONTHLY SOURCE-LATENT SUMMARY FOR BUILDING WEATHER FILE- TMY RALEIGH, NC

| MONTH | SENSIBLE COOLING ENERGY (MBTU) | LATENT COOLING ENERGY (MBTU) | MAX TOTAL COOLING ENERGY (KBTU/HR) | SENSIBLE HEAT RATIO AT MAX | TIME OF MAX DY | TIME OF MAX HR | SENSIBLE HEATING ENERGY (MBTU) | LATENT HEATING ENERGY (MBTU) | MAX TOTAL HEATING ENERGY (KBTU/HR) |
|---|---|---|---|---|---|---|---|---|---|
| JAN | 0.00000 | 0.00000 | 0.000 | | | | -101.66598 | 0.00000 | -441.83203 |
| FEB | 0.00000 | 0.00000 | 0.000 | | | | -77.72722 | 0.00000 | -414.11862 |
| MAR | 0.00000 | 0.00000 | 0.000 | | | | -46.19206 | 0.00000 | -237.85420 |
| APR | 7.07172 | 0.00000 | 265.983 | 1.000 | 27 | 17 | -2.35522 | 0.00000 | -109.237 |
| MAY | 51.72304 | 6.19469 | 448.060 | 0.743 | 31 | 16 | 0.00000 | 0.00000 | 0.000 |
| JUN | 77.69568 | 27.09459 | 524.310 | 0.549 | 27 | 14 | 0.00000 | 0.00000 | 0.000 |
| JUL | 91.41283 | 35.98078 | 486.248 | 0.634 | 29 | 17 | 0.00000 | 0.00000 | 0.000 |
| AUG | 96.86974 | 38.47906 | 520.993 | 0.375 | 2 | 12 | 0.00000 | 0.00000 | 0.000 |
| S[redacted] | 59.20230 | 15.81241 | 481.526 | 0.480 | 7 | 15 | 0.00000 | 0.00000 | 0.000 |
| OCT | 14.25062 | 3.33803 | 449.077 | 0.390 | 7 | 17 | -10.10736 | 0.00000 | -183.085 |
| NOV | 0.00000 | 0.00000 | 0.000 | | | | -55.04679 | 0.00000 | -331.12048 |
| DEC | 0.00000 | 0.00000 | 0.000 | | | | -78.20684 | 0.00000 | -306.93356 |
| TOTAL | 398.226 | 126.900 | | | | | -371.301 | 0.000 | |
| MAX | | | 524.310 | 0.379 | | | | | -441.832 |

FT BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
[redacted]ING 1242 BASE CASE PRESENT ENERGY USAGE
REPORT- SS-J SYSTEM PEAK HEATING AND COOLING DAYS FOR BUILDING WEATHER FILE- TMY RALEIGH, NC

| | - - - - - C O O L I N G - - - - - | | | | - - - H E A T I N G - - - | | |
|---|---|---|---|---|---|---|---|
| | JUN 27 | | | | JAN 16 | | |
| HOUR | HOURLY COOLING LOAD (KBTU) | SENSIBLE HEAT RATIO | DRY-BULB TEMP | WET-BULB TEMP | HOURLY HEATING LOAD (KBTU) | DRY-BULB TEMP | WET-BULB TEMP |
| 1 | 152.545 | 0.783 | 76.F | 74.F | -83.037 | 35.F | 34.F |
| 2 | 135.578 | 0.838 | 76.F | 73.F | -128.854 | 35.F | 34.F |
| 3 | 110.399 | 0.523 | 75.F | 73.F | -115.252 | 33.F | 33.F |
| 4 | 103.314 | 0.538 | 75.F | 73.F | -214.161 | 32.F | 32.F |
| 5 | 100.438 | 0.537 | 75.F | 73.F | -217.728 | 30.F | 30.F |
| 6 | 415.984 | 0.377 | 75.F | 73.F | -302.387 | 27.F | 26.F |
| 7 | 444.656 | 0.379 | 75.F | 73.F | -333.026 | 25.F | 23.F |
| 8 | 324.051 | 0.677 | 78.F | 74.F | -388.674 | 20.F | 19.F |
| 9 | 370.613 | 0.664 | 81.F | 75.F | -430.176 | 17.F | 16.F |
| 10 | 404.900 | 0.662 | 84.F | 76.F | -441.832 | 14.F | 13.F |
| [redacted] | 445.619 | 0.635 | 85.F | 77.F | -369.727 | 15.F | 13.F |
| [redacted] | 482.643 | 0.633 | 87.F | 77.F | -393.704 | 14.F | 12.F |
| 13 | 524.310 | 0.610 | 88.F | 78.F | -412.268 | 14.F | 12.F |
| 14 | 514.943 | 0.630 | 88.F | 77.F | -379.282 | 14.F | 12.F |
| 15 | 516.835 | 0.643 | 89.F | 77.F | -438.022 | 15.F | 12.F |
| 16 | 524.191 | 0.642 | 89.F | 77.F | -407.192 | 15.F | 13.F |
| 17 | 360.119 | 0.667 | 89.F | 77.F | -411.060 | 15.F | 12.F |
| 18 | 350.960 | 0.685 | 88.F | 77.F | -359.776 | 13.F | 11.F |
| 19 | 314.592 | 0.730 | 88.F | 76.F | -361.697 | 13.F | 11.F |
| 20 | 304.003 | 0.715 | 86.F | 76.F | -365.302 | 13.F | 11.F |
| 21 | 285.920 | 0.696 | 83.F | 76.F | -338.325 | 12.F | 10.F |
| 22 | 250.370 | 0.707 | 81.F | 75.F | -322.276 | 12.F | 10.F |
| 23 | 215.207 | 0.722 | 79.F | 74.F | -341.554 | 12.F | 10.F |
| 24 | 197.942 | 0.732 | 78.F | 74.F | -372.472 | 13.F | 12.F |
| MAX | 524.310 | | | | -441.832 | | |

FT BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
[redacted]DING 1242 BASE CASE PRESENT ENERGY USAGE
[redacted]RT- SS-K SPACE TEMPERATURE SUMMARY BUILDING WEATHER FILE- TMY RALEIGH, NC

| | AVERAGE SPACE TEMP | | | | | AVERAGE TEMPERATURE DIFFERENCE BETWEEN OUTDOOR& ROOM AIR | | | SUMMED TEMP DIFFERENCE BETWEEN OUTDOOR& ROOM AIR | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | ALL HOURS (F) | COOLING HOURS (F) | HEATING HOURS (F) | FAN ON HOURS (F) | FAN OFF HOURS (F) | ALL HOURS (F) | FAN ON HOURS (F) | FAN OFF HOURS (F) | HEATING HOURS (F) | ALL HOURS (F) | HUMIDITY RATIO DIFFERENCE BETWEEN OUTDOOR AND ROOM AIR (PERCENT-RH ) |
| JAN | 75.55 | | 75.54 | 75.55 | 0.00 | -38.36 | -38.36 | 0.00 | 1181.13 | 1189.09 | -0.00046 |
| FEB | 75.85 | | 75.83 | 75.85 | 0.00 | -36.41 | -36.41 | 0.00 | 1006.66 | 1019.50 | -0.00047 |
| MAR | 76.08 | | 75.78 | 76.08 | 0.00 | -27.98 | -27.98 | 0.00 | 808.51 | 867.25 | -0.00043 |
| APR | 76.40 | 76.41 | 75.76 | 76.40 | 0.00 | -16.67 | -16.67 | 0.00 | 114.87 | 503.52 | -0.00035 |
| MAY | 76.79 | 77.22 | | 76.79 | 0.00 | -8.82 | -8.82 | 0.00 | | 323.30 | -0.00004 |
| JUN | 77.75 | 77.67 | | 77.75 | 0.00 | -3.86 | -3.86 | 0.00 | | 222.13 | 0.00109 |
| [redacted] | 78.23 | 78.09 | | 78.23 | 0.00 | -1.73 | -1.73 | 0.00 | | 194.34 | 0.00135 |
| AUG | 77.86 | 77.78 | | 77.86 | 0.00 | -1.56 | -1.56 | 0.00 | | 190.74 | 0.00142 |
| SEP | 77.52 | 77.32 | | 77.52 | 0.00 | -5.50 | -5.50 | 0.00 | | 253.62 | 0.00049 |
| OCT | 76.80 | 76.79 | 76.18 | 76.80 | 0.00 | -18.17 | -18.17 | 0.00 | 278.77 | 571.62 | -0.00028 |
| NOV | 76.19 | | 75.88 | 76.19 | 0.00 | -29.74 | -29.74 | 0.00 | 838.17 | 892.27 | -0.00045 |
| DEC | 75.55 | | 75.52 | 75.55 | 0.00 | -34.29 | -34.29 | 0.00 | 1047.74 | 1063.06 | -0.00046 |
| ANNUAL | 76.72 | 77.60 | 75.74 | 76.72 | 0.00 | -18.50 | -18.50 | 0.00 | 5275.84 | 7290.44 | 0.00012 |

FT [redacted]AGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
BU[redacted]NG 1242 BASE CASE PRESENT ENERGY USAGE
REPORT- SS-L FAN ELECTRIC ENERGY BUILDING WEATHER FILE- TMY RALEIGH, NC

| MONTH | FAN ELECTRIC ENERGY DURING HEATING (KWH) | FAN ELECTRIC ENERGY DURING COOLING (KWH) | FAN ELECTRIC ENERGY DURING HEATING-COOLING (KWH) | FAN ELECTRIC ENERGY DURING FLOATING (KWH) |
|---|---|---|---|---|
| JAN | 6657.432 | 0.000 | 0.000 | 81.520 |
| FEB | 5969.053 | 0.000 | 0.000 | 117.751 |
| MAR | 5978.110 | 0.000 | 0.000 | 760.850 |
| APR | 1304.315 | 688.388 | 0.000 | 4528.892 |
| MAY | 0.000 | 3469.133 | 0.000 | 3269.860 |
| JUN | 0.000 | 5054.233 | 0.000 | 1467.354 |
| JUL | 0.000 | 5851.304 | 0.000 | 887.659 |
| [redacted] | 0.000 | 6086.802 | 0.000 | 652.157 |
| SEP | 0.000 | 4184.702 | 0.000 | 2336.901 |
| OCT | 2364.074 | 1123.160 | 0.000 | 3251.745 |
| NOV | 5715.439 | 0.000 | 0.000 | 806.139 |
| DEC | 6584.971 | 0.000 | 0.000 | 153.982 |
| ANNUAL | 34574.969 | 26458.469 | 0.000 | 18314.793 |

FT BRAGG ENERGY STUDY — HISTORIC RED BRICK BLDG AREA — DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
BUILDING 1242 — BASE CASE — PRESENT ENERGY USAGE
REPORT- SS-G ZONE LOADS SUMMARY IN — BUILDING FOR FIRSTFL — WEATHER FILE- TMY RALEIGH, NC

| | COOLING | | | | | HEATING | | | | | ELEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | COOLING ENERGY (MBTU) | TIME OF MAX DY HR | DRY-BULB TEMP | WET-BULB TEMP | MAXIMUM COOLING LOAD (KBTU/HR) | HEATING ENERGY (MBTU) | TIME OF MAX DY HR | DRY-BULB TEMP | WET-BULB TEMP | MAXIMUM HEATING LOAD (KBTU/HR) | ELEC-TRICAL ENERGY (KWH) | MAXIMUM ELEC LOAD (KW) |
| JAN | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2391. | 9.196 |
| FEB | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2163. | 9.196 |
| MAR | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2582. | 9.196 |
| APR | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2378. | 9.196 |
| MAY | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2391. | 9.196 |
| JUN | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2474. | 9.196 |
| JUL | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2296. | 9.196 |
| [illegible] | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2582. | 9.196 |
| SEP | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2378. | 9.196 |
| OCT | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2296. | 9.196 |
| NOV | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2283. | 9.196 |
| DEC | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2391. | 9.196 |
| TOTAL | 0.000 | | | | | 0.000 | | | | | 28602. | |
| MAX | | | | | 0.000 | | | | | 0.000 | | 9.196 |

FT BRAGG ENERGY STUDY | HISTORIC RED BRICK BLDG AREA | DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
BUILDING 1242 | BASE CASE | PRESENT ENERGY USAGE
REPORT- SS-F ZONE DEMAND SUMMARY IN BUILDING FOR FIRSTFL | WEATHER FILE- TMY RALEIGH, NC

| | ---DEMANDS--- | | --BASEBOARDS-- | | --TEMPERATURES-- | | --LOADS NOT MET-- | |
|---|---|---|---|---|---|---|---|---|
| MONTH | HEAT EXTRACTION ENERGY (MBTU) | HEAT ADDITION ENERGY (MBTU) | BASEBOARD ENERGY (MBTU) | MAXIMUM BASEBOARD LOAD (KBTU/HR) | MAXIMUM ZONE TEMP (F) | MINIMUM ZONE TEMP (F) | HOURS UNDER HEATED | HOURS UNDER COOLED |
| JAN | 1.68454 | -8.151 | 0.00000 | 0.000 | 77.9 | 73.8 | 0 | 0 |
| FEB | 1.28329 | -5.942 | 0.00000 | 0.000 | 76.5 | 73.9 | 0 | 0 |
| MAR | 2.25495 | -3.333 | 0.00000 | 0.000 | 79.0 | 74.3 | 0 | 5 |
| APR | 5.27913 | -0.349 | 0.00000 | 0.000 | 84.9 | 67.1 | 1 | 48 |
| MAY | 8.97991 | -0.337 | 0.00000 | 0.000 | 76.9 | 63.7 | 0 | 0 |
| JUN | 11.37358 | -0.005 | 0.00000 | 0.000 | 77.0 | 74.7 | 0 | 0 |
| JUL | 11.74561 | 0.000 | 0.00000 | 0.000 | 77.0 | 75.4 | 0 | 0 |
| AUG | 12.69283 | 0.000 | 0.00000 | 0.000 | 77.0 | 75.2 | 0 | 0 |
| SEP | 9.77119 | -0.021 | 0.00000 | 0.000 | 77.0 | 74.4 | 0 | 0 |
| OCT | 5.65583 | -1.105 | 0.00000 | 0.000 | 82.5 | 69.1 | 1 | 24 |
| NOV | 2.25614 | -4.347 | 0.00000 | 0.000 | 81.5 | 74.1 | 0 | 7 |
| DEC | 1.71216 | -5.991 | 0.00000 | 0.000 | 77.3 | 74.2 | 0 | 0 |

FT BRAGG ENERGY STUDY — HISTORIC RED BRICK BLDG AREA — DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
BUILDING 1242 — BASE CASE — PRESENT ENERGY USAGE
[redacted]RT- SS-G ZONE LOADS SUMMARY IN — BUILDING FOR SECONDFL — WEATHER FILE- TMY RALEIGH, NC

| | COOLING | | | | | HEATING | | | | | ELEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | COOLING ENERGY (MBTU) | TIME OF MAX DY HR | DRY-BULB TEMP | WET-BULB TEMP | MAXIMUM COOLING LOAD (KBTU/HR) | HEATING ENERGY (MBTU) | TIME OF MAX DY HR | DRY-BULB TEMP | WET-BULB TEMP | MAXIMUM HEATING LOAD (KBTU/HR) | ELEC-TRICAL ENERGY (KWH) | MAXIMUM ELEC LOAD (KW) |
| JAN | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 7732. | 22.750 |
| FEB | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 6983. | 22.750 |
| MAR | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 7662. | 22.750 |
| APR | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 7459. | 22.750 |
| MAY | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 7732. | 22.750 |
| JUN | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 7424. | 22.750 |
| JUL | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 7767. | 22.750 |
| [redacted] | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 7662. | 22.750 |
| SEP | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 7459. | 22.750 |
| OCT | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 7767. | 22.750 |
| NOV | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 7494. | 22.750 |
| DEC | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 7732. | 22.750 |
| TOTAL | 0.000 | | | | | 0.000 | | | | | 90870. | |
| MAX | | | | | 0.000 | | | | | 0.000 | | 22.750 |

FT BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
BUILDING 1242 BASE CASE PRESENT ENERGY USAGE
REPORT- SS-F ZONE DEMAND SUMMARY IN BUILDING FOR SECONDFL WEATHER FILE- TMY RALEIGH, NC

| | DEMANDS | | BASEBOARDS | | TEMPERATURES | | LOADS NOT MET | |
|---|---|---|---|---|---|---|---|---|
| MONTH | HEAT EXTRACTION ENERGY (MBTU) | HEAT ADDITION ENERGY (MBTU) | BASEBOARD ENERGY (MBTU) | MAXIMUM BASEBOARD LOAD (KBTU/HR) | MAXIMUM ZONE TEMP (F) | MINIMUM ZONE TEMP (F) | HOURS UNDER HEATED | HOURS UNDER COOLED |
| JAN | 5.06803 | -11.483 | 0.00000 | 0.000 | 82.4 | 71.8 | 0 | 0 |
| FEB | 5.54551 | -7.861 | 0.00000 | 0.000 | 82.2 | 72.5 | 0 | 0 |
| MAR | 8.97720 | -3.289 | 0.00000 | 0.000 | 82.5 | 72.4 | 0 | 0 |
| APR | 19.80321 | -0.035 | 0.00000 | 0.000 | 85.0 | 69.5 | 0 | 0 |
| MAY | 29.83605 | 0.000 | 0.00000 | 0.000 | 83.5 | 68.8 | 3 | 0 |
| JUN | 34.98360 | 0.000 | 0.00000 | 0.000 | 83.4 | 72.5 | 0 | 0 |
| JUL | 37.20374 | 0.000 | 0.00000 | 0.000 | 83.2 | 72.5 | 0 | 0 |
| AUG | 37.99163 | 0.000 | 0.00000 | 0.000 | 83.2 | 72.4 | 0 | 0 |
| SEP | 31.06219 | 0.000 | 0.00000 | 0.000 | 83.8 | 72.4 | 0 | 0 |
| OCT | 20.54870 | -0.509 | 0.00000 | 0.000 | 85.0 | 72.2 | 0 | 0 |
| NOV | 8.96300 | -4.927 | 0.00000 | 0.000 | 82.5 | 72.4 | 0 | 0 |
| DEC | 5.32018 | -7.071 | 0.00000 | 0.000 | 82.2 | 72.0 | 0 | 0 |

FT BRAGG ENERGY STUDY
BUILDING 1242
REPORT- SS-G ZONE LOADS SUMMARY IN

HISTORIC RED BRICK BLDG AREA
BASE CASE
BUILDING FOR THIRDFL

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
PRESENT ENERGY USAGE
WEATHER FILE- TMY RALEIGH, NC

| | COOLING | | | | | HEATING | | | | | ELEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | COOLING ENERGY (MBTU) | TIME OF MAX DY HR | DRY-BULB TEMP | WET-BULB TEMP | MAXIMUM COOLING LOAD (KBTU/HR) | HEATING ENERGY (MBTU) | TIME OF MAX DY HR | DRY-BULB TEMP | WET-BULB TEMP | MAXIMUM HEATING LOAD (KBTU/HR) | ELEC-TRICAL ENERGY (KWH) | MAXIMUM ELEC LOAD (KW) |
| JAN | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 7732. | 22.750 |
| FEB | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 6983. | 22.750 |
| MAR | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 7662. | 22.750 |
| APR | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 7459. | 22.750 |
| MAY | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 7732. | 22.750 |
| JUN | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 7424. | 22.750 |
| JUL | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 7767. | 22.750 |
| AUG | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 7662. | 22.750 |
| SEP | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 7459. | 22.750 |
| OCT | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 7767. | 22.750 |
| NOV | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 7494. | 22.750 |
| DEC | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 7732. | 22.750 |
| TOTAL | 0.000 | | | | | 0.000 | | | | | 90870. | |
| MAX | | | | | 0.000 | | | | | 0.000 | | 22.750 |

FT BRAGG ENERGY STUDY
BUILDING 1242
REPORT- SS-F ZONE DEMAND SUMMARY IN BUILDING

HISTORIC RED BRICK BLDG AREA
BASE CASE
FOR THIRDFL

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
PRESENT ENERGY USAGE
WEATHER FILE- TMY RALEIGH, NC

| | - - - -D E M A N D S- - - - - | - -B A S E B O A R D S- - - | - -T E M P E R A T U R E S- - | - -L O A D S N O T M E T- - | |
|---|---|---|---|---|---|
| MONTH | HEAT EXTRACTION ENERGY (MBTU) | HEAT ADDITION ENERGY (MBTU) | BASEBOARD ENERGY (MBTU) | MAXIMUM BASEBOARD LOAD (KBTU/HR) | MAXIMUM ZONE TEMP (F) | MINIMUM ZONE TEMP (F) | HOURS UNDER HEATED | HOURS UNDER COOLED |
| JAN | 1.67783 | -19.985 | 0.00000 | 0.000 | 79.1 | 67.5 | 4 | 0 |
| FEB | 2.05464 | -14.028 | 0.00000 | 0.000 | 79.5 | 68.9 | 3 | 0 |
| MAR | 4.95725 | -6.590 | 0.00000 | 0.000 | 80.7 | 69.8 | 4 | 0 |
| APR | 16.95705 | -0.148 | 0.00000 | 0.000 | 84.5 | 68.2 | 0 | 0 |
| MAY | 29.96055 | -0.002 | 0.00000 | 0.000 | 83.9 | 67.1 | 2 | 0 |
| JUN | 37.29720 | 0.000 | 0.00000 | 0.000 | 84.0 | 73.0 | 0 | 0 |
| JUL | 40.54243 | 0.000 | 0.00000 | 0.000 | 84.0 | 73.5 | 0 | 0 |
| | 40.92525 | 0.000 | 0.00000 | 0.000 | 83.7 | 73.3 | 0 | 0 |
| SEP | 32.00864 | 0.000 | 0.00000 | 0.000 | 84.3 | 72.2 | 0 | 0 |
| OCT | 17.09072 | -1.176 | 0.00000 | 0.000 | 84.0 | 71.0 | 0 | 0 |
| NOV | 4.63850 | -9.174 | 0.00000 | 0.000 | 80.3 | 69.3 | 1 | 0 |
| DEC | 1.86481 | -14.513 | 0.00000 | 0.000 | 79.6 | 68.6 | 4 | 0 |

FT BRAGG ENERGY STUDY — HISTORIC RED BRICK BLDG AREA — DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
BUILDING 1242 — BASE CASE — PRESENT ENERGY USAGE
[redacted]T- SS-G ZONE LOADS SUMMARY IN BUILDING FOR SFBATH — WEATHER FILE- TMY RALEIGH, NC

| | COOLING | | | | | HEATING | | | | | ELEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | COOLING ENERGY (MBTU) | TIME OF MAX DY HR | DRY-BULB TEMP | WET-BULB TEMP | MAXIMUM COOLING LOAD (KBTU/HR) | HEATING ENERGY (MBTU) | TIME OF MAX DY HR | DRY-BULB TEMP | WET-BULB TEMP | MAXIMUM HEATING LOAD (KBTU/HR) | ELEC-TRICAL ENERGY (KWH) | MAXIMUM ELEC LOAD (KW) |
| JAN | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 502. | 1.439 |
| FEB | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 454. | 1.439 |
| MAR | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 499. | 1.439 |
| APR | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 485. | 1.439 |
| MAY | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 502. | 1.439 |
| JUN | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 483. | 1.439 |
| JUL | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 504. | 1.439 |
| [redacted] | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 499. | 1.439 |
| SEP | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 485. | 1.439 |
| OCT | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 504. | 1.439 |
| NOV | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 487. | 1.439 |
| DEC | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 502. | 1.439 |
| TOTAL | 0.000 | | | | | 0.000 | | | | | 5906. | |
| MAX | | | | | 0.000 | | | | | 0.000 | | 1.439 |

| MONTH | HEAT EXTRACTION ENERGY (MBTU) | HEAT ADDITION ENERGY (MBTU) | BASEBOARD ENERGY (MBTU) | MAXIMUM BASEBOARD LOAD (KBTU/HR) | MAXIMUM ZONE TEMP (F) | MINIMUM ZONE TEMP (F) | HOURS UNDER HEATED | HOURS UNDER COOLED |
|---|---|---|---|---|---|---|---|---|
| | - - - -D E M A N D S- - - - - | | - -B A S E B O A R D S- - - | | - -T E M P E R A T U R E S- - | | - -L O A D S N O T M E T- - | |
| JAN | 0.19785 | -1.487 | -1.82110 | -11.978 | 77.3 | 74.3 | 0 | 0 |
| FEB | 0.17338 | -1.054 | -1.58559 | -12.475 | 77.8 | 74.2 | 0 | 0 |
| MAR | 0.30398 | -0.590 | -1.30451 | -8.357 | 79.8 | 74.5 | 0 | 0 |
| APR | 0.83505 | -0.049 | -0.17853 | -4.937 | 82.9 | 64.5 | 3 | 0 |
| MAY | 1.74050 | -0.028 | 0.00000 | 0.000 | 81.5 | 64.9 | 1 | 0 |
| JUN | 2.34640 | 0.000 | 0.00000 | 0.000 | 82.5 | 72.3 | 0 | 0 |
| JUL | 2.62096 | 0.000 | 0.00000 | 0.000 | 82.4 | 74.1 | 0 | 0 |
| [illegible] | 2.80033 | 0.000 | 0.00000 | 0.000 | 82.8 | 74.0 | 0 | 0 |
| SEP | 2.16232 | 0.000 | 0.00000 | 0.000 | 84.5 | 71.8 | 0 | 0 |
| OCT | 1.18058 | -0.130 | -0.23494 | -7.205 | 84.6 | 69.5 | 0 | 0 |
| NOV | 0.36504 | -0.737 | -1.16720 | -10.404 | 80.0 | 74.4 | 0 | 0 |
| DEC | 0.20744 | -1.064 | -1.56946 | -9.267 | 77.8 | 74.4 | 0 | 0 |

FT BRAGG ENERGY STUDY
BUILDING 1242
REPORT- SS-G ZONE LOADS SUMMARY IN

HISTORIC RED BRICK BLDG AREA
BASE CASE
BUILDING FOR TFBATH

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
PRESENT ENERGY USAGE
WEATHER FILE- TMY RALEIGH, NC

| | COOLING | | | | | HEATING | | | | | ELEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | COOLING ENERGY (MBTU) | TIME OF MAX DY HR | DRY-BULB TEMP | WET-BULB TEMP | MAXIMUM COOLING LOAD (KBTU/HR) | HEATING ENERGY (MBTU) | TIME OF MAX DY HR | DRY-BULB TEMP | WET-BULB TEMP | MAXIMUM HEATING LOAD (KBTU/HR) | ELEC-TRICAL ENERGY (KWH) | MAXIMUM ELEC LOAD (KW) |
| JAN | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 502. | 1.439 |
| FEB | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 454. | 1.439 |
| MAR | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 499. | 1.439 |
| APR | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 485. | 1.439 |
| MAY | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 502. | 1.439 |
| JUN | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 483. | 1.439 |
| JUL | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 504. | 1.439 |
| | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 499. | 1.439 |
| SEP | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 485. | 1.439 |
| OCT | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 504. | 1.439 |
| NOV | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 487. | 1.439 |
| DEC | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 502. | 1.439 |
| TOTAL | 0.000 | | | | | 0.000 | | | | | 5906. | |
| MAX | | | | | 0.000 | | | | | 0.000 | | 1.439 |

FT BRAGG ENERGY STUDY | HISTORIC RED BRICK BLDG AREA | DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
BUILDING 1242 | BASE CASE | PRESENT ENERGY USAGE
REPORT- SS-F ZONE DEMAND SUMMARY IN BUILDING FOR TFBATH | WEATHER FILE- TMY RALEIGH, NC

| | DEMANDS | | BASEBOARDS | | TEMPERATURES | | LOADS NOT MET | |
|---|---|---|---|---|---|---|---|---|
| MONTH | HEAT EXTRACTION ENERGY (MBTU) | HEAT ADDITION ENERGY (MBTU) | BASEBOARD ENERGY (MBTU) | MAXIMUM BASEBOARD LOAD (KBTU/HR) | MAXIMUM ZONE TEMP (F) | MINIMUM ZONE TEMP (F) | HOURS UNDER HEATED | HOURS UNDER COOLED |
| JAN | 0.19682 | -1.933 | -2.92860 | -13.715 | 75.9 | 74.1 | 0 | 0 |
| FEB | 0.15708 | -1.436 | -2.40778 | -13.261 | 76.3 | 74.2 | 0 | 0 |
| MAR | 0.29791 | -0.791 | -2.02042 | -9.424 | 78.9 | 74.4 | 0 | 0 |
| APR | 0.85421 | -0.099 | -0.32855 | -7.147 | 82.5 | 63.5 | 2 | 0 |
| MAY | 1.97746 | -0.062 | 0.00000 | 0.000 | 81.5 | 63.3 | 0 | 0 |
| JUN | 2.73139 | 0.000 | 0.00000 | 0.000 | 82.2 | 71.5 | 0 | 0 |
| JUL | 3.09002 | 0.000 | 0.00000 | 0.000 | 82.5 | 73.2 | 0 | 0 |
| | 3.23991 | 0.000 | 0.00000 | 0.000 | 82.4 | 73.1 | 0 | 0 |
| SEP | 2.40195 | 0.000 | 0.00000 | 0.000 | 83.7 | 70.7 | 0 | 0 |
| OCT | 1.16481 | -0.211 | -0.50074 | -8.404 | 83.4 | 67.6 | 0 | 0 |
| NOV | 0.34257 | -1.033 | -1.90892 | -11.635 | 78.5 | 74.3 | 0 | 0 |
| DEC | 0.20049 | -1.437 | -2.58232 | -10.541 | 76.5 | 74.4 | 0 | 0 |

FT BRAGG ENERGY STUDY — HISTORIC RED BRICK BLDG AREA — DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
LDING 1242 — BASE CASE — PRESENT ENERGY USAGE
PORT- SS-A SYSTEM MONTHLY LOADS SUMMARY FOR BATHSYS — WEATHER FILE- TMY RALEIGH, NC

| | COOLING | | | | | HEATING | | | | | ELEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | COOLING ENERGY (MBTU) | TIME OF MAX DY | TIME OF MAX HR | DRY-BULB TEMP | WET-BULB TEMP | MAXIMUM COOLING LOAD (KBTU/HR) | HEATING ENERGY (MBTU) | TIME OF MAX DY | TIME OF MAX HR | DRY-BULB TEMP | WET-BULB TEMP | MAXIMUM HEATING LOAD (KBTU/HR) | ELEC-TRICAL ENERGY (KWH) | MAXIMUM ELEC LOAD (KW) |
| JAN | 0.00000 | | | | | 0.000 | -0.079 | 15 | 22 | 36.F | 34.F | -1.793 | 3206. | 8.508 |
| FEB | 0.00000 | | | | | 0.000 | -0.046 | 9 | 8 | 23.F | 20.F | -1.139 | 2896. | 8.508 |
| MAR | 0.00000 | | | | | 0.000 | -0.046 | 2 | 23 | 44.F | 41.F | -0.932 | 3184. | 8.508 |
| APR | 0.00000 | | | | | 0.000 | -0.018 | 14 | 23 | 56.F | 55.F | -0.836 | 3095. | 8.508 |
| MAY | 0.00000 | | | | | 0.000 | 0.000 | | | | | 0.000 | 3206. | 8.508 |
| JUN | 0.00000 | | | | | 0.000 | 0.000 | | | | | 0.000 | 3084. | 8.508 |
| JUL | 0.00000 | | | | | 0.000 | 0.000 | | | | | 0.000 | 3218. | 8.508 |
| AUG | 0.00000 | | | | | 0.000 | 0.000 | | | | | 0.000 | 3184. | 8.508 |
| SEP | 0.00000 | | | | | 0.000 | 0.000 | | | | | 0.000 | 3095. | 8.508 |
| OCT | 0.00000 | | | | | 0.000 | -0.043 | 24 | 8 | 66.F | 60.F | -1.417 | 3218. | 8.508 |
| NOV | 0.00000 | | | | | 0.000 | -0.074 | 24 | 24 | 40.F | 36.F | -1.265 | 3107. | 8.508 |
| DEC | 0.00000 | | | | | 0.000 | -0.042 | 2 | 23 | 46.F | 42.F | -0.948 | 3206. | 8.508 |
| TOTAL | 0.000 | | | | | | -0.348 | | | | | | 37697. | |
| MAX | | | | | | 0.000 | | | | | | -1.793 | | 8.508 |

FT BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
LDING 1242 BASE CASE PRESENT ENERGY USAGE
ORT- SS-B SYSTEM MONTHLY LOADS SUMMARY FOR BATHSYS WEATHER FILE- TMY RALEIGH, NC

| | -ZONE COOLING- | | -ZONE HEATING- | | --BASEBOARDS-- | | ----PRE-HEAT--- | |
|---|---|---|---|---|---|---|---|---|
| MONTH | ZONE COIL COOLING ENERGY (MBTU) | MAXIMUM ZONE COIL COOLING LOAD (KBTU/HR) | ZONE COIL HEATING ENERGY (MBTU) | MAXIMUM ZONE COIL HEATING LOAD (KBTU/HR) | BASEBOARD HEATING ENERGY (MBTU) | MAXIMUM BASEBOARD HEATING LOAD (KBTU/HR) | PRE-HEAT COIL ENERGY (MBTU) | MAXIMUM PRE-HEAT COIL LOAD (KBTU/HR) |
| JAN | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 |
| FEB | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 |
| MAR | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 |
| APR | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 |
| MAY | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 |
| JUN | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 |
| [illegible] | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 |
| AUG | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 |
| SEP | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 |
| OCT | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 |
| NOV | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 |
| DEC | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 | 0.00000 | 0.000 |
| TOTAL | 0.000 | | 0.000 | | 0.000 | | 0.000 | |
| MAX | | 0.000 | | 0.000 | | 0.000 | | 0.000 |

FT BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
BUILDING 1242 BASE CASE PRESENT ENERGY USAGE
REPORT- SS-I SYSTEM MONTHLY SOURCE-LATENT SUMMARY FOR BATHSYS WEATHER FILE- TMY RALEIGH, NC

| MONTH | SENSIBLE COOLING ENERGY (MBTU) | LATENT COOLING ENERGY (MBTU) | MAX TOTAL COOLING ENERGY (KBTU/HR) | SENSIBLE HEAT RATIO AT MAX | TIME OF MAX DY HR | SENSIBLE HEATING ENERGY (MBTU) | LATENT HEATING ENERGY (MBTU) | MAX TOTAL HEATING ENERGY (KBTU/HR) |
|---|---|---|---|---|---|---|---|---|
| JAN | 0.00000 | 0.00000 | 0.000 | | | -0.07865 | 0.00000 | -1.79308 |
| FEB | 0.00000 | 0.00000 | 0.000 | | | -0.04573 | 0.00000 | -1.13853 |
| MAR | 0.00000 | 0.00000 | 0.000 | | | -0.04582 | 0.00000 | -0.93229 |
| APR | 0.00000 | 0.00000 | 0.000 | | | -0.01812 | 0.00000 | -0.83565 |
| MAY | 0.00000 | 0.00000 | 0.000 | | | 0.00000 | 0.00000 | 0.00000 |
| JUN | 0.00000 | 0.00000 | 0.000 | | | 0.00000 | 0.00000 | 0.00000 |
| JUL | 0.00000 | 0.00000 | 0.000 | | | 0.00000 | 0.00000 | 0.00000 |
| AUG | 0.00000 | 0.00000 | 0.000 | | | 0.00000 | 0.00000 | 0.00000 |
| SEP | 0.00000 | 0.00000 | 0.000 | | | 0.00000 | 0.00000 | 0.00000 |
| [illegible] | 0.00000 | 0.00000 | 0.000 | | | -0.04308 | 0.00000 | -1.41660 |
| NOV | 0.00000 | 0.00000 | 0.000 | | | -0.07448 | 0.00000 | -1.26488 |
| DEC | 0.00000 | 0.00000 | 0.000 | | | -0.04201 | 0.00000 | -0.94784 |
| TOTAL | 0.000 | 0.000 | | | | -0.348 | 0.000 | |
| MAX | | | 0.000 | 0.000 | | | | -1.793 |

FT BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
[redacted]ING 1242 BASE CASE PRESENT ENERGY USAGE
[redacted]T- SS-J SYSTEM PEAK HEATING AND COOLING DAYS FOR BATHSYS WEATHER FILE- TMY RALIEGH, NC

| | - - - - - C O O L I N G - - - - - | | | | - - - H E A T I N G - - - | | |
|---|---|---|---|---|---|---|---|
| | | DEC 31 | | | | JAN 15 | |
| HOUR | HOURLY COOLING LOAD (KBTU) | SENSIBLE HEAT RATIO | DRY-BULB TEMP | WET-BULB TEMP | HOURLY HEATING LOAD (KBTU) | DRY-BULB TEMP | WET-BULB TEMP |
| 1 | 0.000 | 0.000 | 44.F | 43.F | 0.000 | 55.F | 51.F |
| 2 | 0.000 | 0.000 | 44.F | 43.F | 0.000 | 54.F | 50.F |
| 3 | 0.000 | 0.000 | 45.F | 43.F | 0.000 | 54.F | 50.F |
| 4 | 0.000 | 0.000 | 45.F | 44.F | 0.000 | 53.F | 49.F |
| 5 | 0.000 | 0.000 | 49.F | 47.F | -0.116 | 54.F | 49.F |
| 6 | 0.000 | 0.000 | 52.F | 51.F | 0.000 | 53.F | 48.F |
| 7 | 0.000 | 0.000 | 56.F | 55.F | 0.000 | 52.F | 47.F |
| 8 | 0.000 | 0.000 | 55.F | 54.F | -0.044 | 51.F | 46.F |
| 9 | 0.000 | 0.000 | 55.F | 53.F | 0.000 | 53.F | 46.F |
| 10 | 0.000 | 0.000 | 54.F | 52.F | 0.000 | 56.F | 49.F |
| [redacted] | 0.000 | 0.000 | 54.F | 48.F | 0.000 | 54.F | 50.F |
| [redacted] | 0.000 | 0.000 | 53.F | 45.F | 0.000 | 53.F | 52.F |
| 13 | 0.000 | 0.000 | 53.F | 43.F | 0.000 | 53.F | 52.F |
| 14 | 0.000 | 0.000 | 53.F | 45.F | 0.000 | 52.F | 51.F |
| 15 | 0.000 | 0.000 | 53.F | 48.F | 0.000 | 52.F | 51.F |
| 16 | 0.000 | 0.000 | 53.F | 52.F | 0.000 | 53.F | 52.F |
| 17 | 0.000 | 0.000 | 53.F | 52.F | 0.000 | 53.F | 52.F |
| 18 | 0.000 | 0.000 | 53.F | 52.F | -0.364 | 53.F | 51.F |
| 19 | 0.000 | 0.000 | 53.F | 51.F | -0.238 | 49.F | 48.F |
| 20 | 0.000 | 0.000 | 52.F | 50.F | 0.000 | 40.F | 39.F |
| 21 | 0.000 | 0.000 | 51.F | 49.F | 0.000 | 39.F | 39.F |
| 22 | 0.000 | 0.000 | 50.F | 49.F | -1.793 | 36.F | 34.F |
| 23 | 0.000 | 0.000 | 49.F | 48.F | 0.000 | 35.F | 33.F |
| 24 | 0.000 | 0.000 | 48.F | 47.F | 0.000 | 36.F | 35.F |
| | --- | | | | --- | | |
| MAX | 0.000 | | | | -1.793 | | |

FT BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
LDING 1242 BASE CASE PRESENT ENERGY USAGE
RT- SS-K SPACE TEMPERATURE SUMMARY BATHSYS WEATHER FILE- TMY RALEIGH, NC

| | AVERAGE SPACE TEMP | | | | | AVERAGE TEMPERATURE DIFFERENCE BETWEEN OUTDOOR& ROOM AIR | | | SUMMED TEMP DIFFERENCE BETWEEN OUTDOOR& ROOM AIR | | HUMIDITY RATIO DIFFERENCE BETWEEN OUTDOOR AND ROOM AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | ALL HOURS (F) | COOLING HOURS (F) | HEATING HOURS (F) | FAN ON HOURS (F) | FAN OFF HOURS (F) | ALL HOURS (F) | FAN ON HOURS (F) | FAN OFF HOURS (F) | HEATING HOURS (F) | ALL HOURS (F) | (PERCENT-RH ) |
| JAN | 64.18 | | 63.10 | 64.18 | 0.00 | -26.99 | -26.99 | 0.00 | 316.87 | 839.30 | -0.00162 |
| FEB | 67.40 | | 65.82 | 67.40 | 0.00 | -27.97 | -27.97 | 0.00 | 225.34 | 783.07 | -0.00170 |
| MAR | 75.61 | | 75.21 | 75.61 | 0.00 | -27.51 | -27.51 | 0.00 | 233.15 | 852.84 | -0.00159 |
| APR | 88.92 | | 88.62 | 88.92 | 0.00 | -29.19 | -29.19 | 0.00 | 76.96 | 875.80 | -0.00170 |
| MAY | 98.00 | | | 98.00 | 0.00 | -30.02 | -30.02 | 0.00 | | | -0.00161 |
| JUN | 109.83 | | | 109.83 | 0.00 | -35.95 | -35.95 | 0.00 | | | -0.00237 |
| | 113.74 | | | 113.74 | 0.00 | -37.25 | -37.25 | 0.00 | | | -0.00215 |
| AUG | 115.56 | | | 115.56 | 0.00 | -39.25 | -39.25 | 0.00 | | | -0.00196 |
| SEP | 109.26 | | | 109.26 | 0.00 | -37.24 | -37.24 | 0.00 | | | -0.00177 |
| OCT | 94.59 | | 88.13 | 94.59 | 0.00 | -35.96 | -35.96 | 0.00 | 185.61 | 1114.77 | -0.00235 |
| NOV | 76.29 | | 75.24 | 76.29 | 0.00 | -29.85 | -29.85 | 0.00 | 310.92 | 895.42 | -0.00163 |
| DEC | 67.97 | | 67.39 | 67.97 | 0.00 | -26.71 | -26.71 | 0.00 | 202.37 | 827.91 | -0.00158 |
| ANNUAL | 90.23 | 0.00 | 72.23 | 90.23 | 0.00 | -32.01 | -32.01 | 0.00 | 1551.20 | 11687.07 | -0.00184 |

FT BRAGG ENERGY STUDY
[redacted]DING 1242
[redacted]RT- SS-L FAN ELECTRIC ENERGY

HISTORIC RED BRICK BLDG AREA
BASE CASE
BATHSYS

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
PRESENT ENERGY USAGE
WEATHER FILE- TMY RALEIGH, NC

| MONTH | FAN ELECTRIC ENERGY DURING HEATING (KWH) | FAN ELECTRIC ENERGY DURING COOLING (KWH) | FAN ELECTRIC ENERGY DURING HEATING-COOLING (KWH) | FAN ELECTRIC ENERGY DURING FLOATING (KWH) |
|---|---|---|---|---|
| JAN | 185.540 | 0.000 | 0.000 | 373.331 |
| FEB | 131.456 | 0.000 | 0.000 | 373.331 |
| MAR | 138.967 | 0.000 | 0.000 | 419.903 |
| APR | 43.568 | 0.000 | 0.000 | 497.273 |
| MAY | 0.000 | 0.000 | 0.000 | 558.868 |
| JUN | 0.000 | 0.000 | 0.000 | 540.840 |
| JUL | 0.000 | 0.000 | 0.000 | 558.868 |
| AUG | 0.000 | 0.000 | 0.000 | 558.868 |
| [redacted]EP | 0.000 | 0.000 | 0.000 | 540.840 |
| OCT | 93.146 | 0.000 | 0.000 | 465.724 |
| NOV | 168.263 | 0.000 | 0.000 | 372.580 |
| DEC | 119.437 | 0.000 | 0.000 | 439.434 |
| ANNUAL | 880.364 | 0.000 | 0.000 | 5699.663 |

FT BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
BUI[redacted]G 1242 BASE CASE PRESENT ENERGY USAGE
REP[redacted] SS-G ZONE LOADS SUMMARY IN BATHSYS FOR KITCHEN WEATHER FILE- TMY RALEIGH, NC

| | COOLING | | | | | HEATING | | | | | ELEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | COOLING ENERGY (MBTU) | TIME OF MAX DY HR | DRY-BULB TEMP | WET-BULB TEMP | MAXIMUM COOLING LOAD (KBTU/HR) | HEATING ENERGY (MBTU) | TIME OF MAX DY HR | DRY-BULB TEMP | WET-BULB TEMP | MAXIMUM HEATING LOAD (KBTU/HR) | ELEC-TRICAL ENERGY (KWH) | MAXIMUM ELEC LOAD (KW) |
| JAN | 0.00000 | | | | 0.000 | 0.000 | 21 17 | 59.F | 58.F | 0.000 | 2648. | 7.757 |
| FEB | 0.00000 | | | | 0.000 | 0.000 | 25 16 | 62.F | 46.F | 0.000 | 2391. | 7.757 |
| MAR | 0.00000 | | | | 0.000 | 0.000 | 24 16 | 45.F | 35.F | 0.000 | 2625. | 7.757 |
| APR | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2554. | 7.757 |
| MAY | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2648. | 7.757 |
| JUN | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2543. | 7.757 |
| JUL | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2659. | 7.757 |
| AUG | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2625. | 7.757 |
| SEP | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2554. | 7.757 |
| OCT | 0.00000 | | | | 0.000 | 0.000 | | | | 0.000 | 2659. | 7.757 |
| NOV | 0.00000 | | | | 0.000 | 0.000 | 30 2 | 20.F | 19.F | 0.000 | 2566. | 7.757 |
| DEC | 0.00000 | | | | 0.000 | 0.000 | 7 1 | 35.F | 32.F | 0.000 | 2648. | 7.757 |
| TOTAL | 0.000 | | | | | 0.000 | | | | | 31120. | |
| MAX | | | | | 0.000 | | | | | 0.000 | | 7.757 |

FT BRAGG ENERGY STUDY — HISTORIC RED BRICK BLDG AREA — DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1
DING 1242 — BASE CASE — PRESENT ENERGY USAGE
ORT- SS-F ZONE DEMAND SUMMARY IN BATHSYS FOR KITCHEN — WEATHER FILE- TMY RALEIGH, NC

| | - - - -D E M A N D S- - - - - | | - -B A S E B O A R D S- - - | | - -T E M P E R A T U R E S- - | | - -L O A D S N O T M E T- - | |
|---|---|---|---|---|---|---|---|---|
| MONTH | HEAT EXTRACTION ENERGY (MBTU) | HEAT ADDITION ENERGY (MBTU) | BASEBOARD ENERGY (MBTU) | MAXIMUM BASEBOARD LOAD (KBTU/HR) | MAXIMUM ZONE TEMP (F) | MINIMUM ZONE TEMP (F) | HOURS UNDER HEATED | HOURS UNDER COOLED |
| JAN | 0.00000 | -1.851 | 0.00000 | 0.000 | 77.0 | 50.5 | 12 | 0 |
| FEB | 0.00000 | -1.668 | 0.00000 | 0.000 | 81.2 | 52.8 | 2 | 0 |
| MAR | 0.00000 | -1.845 | 0.00000 | 0.000 | 85.9 | 66.7 | 1 | 0 |
| APR | 0.00000 | -1.771 | 0.00000 | 0.000 | 99.2 | 75.7 | 0 | 0 |
| MAY | 0.00000 | -1.821 | 0.00000 | 0.000 | 113.3 | 81.7 | 0 | 0 |
| JUN | 0.00000 | -1.760 | 0.00000 | 0.000 | 118.8 | 101.9 | 0 | 0 |
| | 0.00000 | -1.822 | 0.00000 | 0.000 | 120.4 | 105.7 | 0 | 0 |
| AUG | 0.00000 | -1.819 | 0.00000 | 0.000 | 123.0 | 103.8 | 0 | 0 |
| SEP | 0.00000 | -1.771 | 0.00000 | 0.000 | 125.3 | 98.9 | 0 | 0 |
| OCT | 0.00000 | -1.842 | 0.00000 | 0.000 | 107.0 | 77.7 | 0 | 0 |
| NOV | 0.00000 | -1.792 | 0.00000 | 0.000 | 88.4 | 60.9 | 3 | 0 |
| DEC | 0.00000 | -1.845 | 0.00000 | 0.000 | 81.0 | 55.5 | 4 | 0 |

FT BRAGG ENERGY STUDY
LDING 1242
ORT- PV-A EQUIPMENT SIZES

HISTORIC RED BRICK BLDG AREA
BASE CASE

DOE-2.1C 2/21/1995 11: 6:41 PDL RUN 1
PRESENT ENERGY USAGE
WEATHER FILE- TMY RALEIGH, NC

| EQUIPMENT | SIZE (MBTU/) | NUMBER INSTD | AVAIL | SIZE (MBTU/) | NUMBER INSTD | AVAIL | SIZE (MBTU/) | NUMBER INSTD | AVAIL | SIZE (MBTU/) | NUMBER INSTD | AVAIL | SIZE (MBTU/) | NUMBER INSTD | AVAIL | SIZE (MBTU/) | NUMBER INSTD | AVAIL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HW-BOILER | 2.000 | 1 | 1 | | | | | | | | | | | | | | | |
| HERM-REC-CHLR | 1.200 | 1 | 1 | | | | | | | | | | | | | | | |

FT BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 PDL RUN 1
BUILDING 1242 BASE CASE PRESENT ENERGY USAGE
REPORT- PS-A PLANT ENERGY UTILIZATION SUMMARY WEATHER FILE- TMY RALEIGH, NC

| | SITE ENERGY | | | | | | | | | | | | SOURCE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| MONTH | TOTAL HEAT LOAD | TOTAL COOLING LOAD | TOTAL ELECTR LOAD | RCVRED ENERGY | WASTED RCVRABL ENERGY | HEAT INPUT COOLING | ELEC INPUT COOLING | FUEL INPUT HEATING | ELEC INPUT HEATING | FUEL INPUT ELECT | TOTAL FUEL INPUT | TOTAL SITE ENERGY | TOTAL SOURCE ENERGY |
| JAN | 187.0 | 0.0 | 130.1<br>38.1E | 0.0 | 0.0 | 0.0 | 0.0<br>0.0E | 317.0 | 20.0<br>5.8E | 0.0 | 317.0 | 447.1 | 707.6 |
| FEB | 150.9 | 0.0 | 116.0<br>34.0E | 0.0 | 0.0 | 0.0 | 0.0<br>0.0E | 256.4 | 16.6<br>4.9E | 0.0 | 256.4 | 372.5 | 604.9 |
| MAR | 112.2 | 0.0 | 123.5<br>36.2E | 0.0 | 0.0 | 0.0 | 0.0<br>0.0E | 190.8 | 13.4<br>3.9E | 0.0 | 190.8 | 314.3 | 561.8 |
| APR | 18.4 | 8.8 | 114.1<br>33.4E | 0.0 | 0.0 | 0.0 | 4.7<br>1.4E | 31.3 | 2.8<br>0.8E | 0.0 | 31.3 | 145.4 | 373.8 |
| MAY | 0.0 | 73.0 | 147.4<br>43.2E | 0.0 | 0.0 | 0.0 | 37.3<br>10.9E | 0.0 | 0.0<br>0.0E | 0.0 | 0.0 | 147.4 | 442.7 |
| JUN | 0.0 | 136.2 | 172.1<br>50.4E | 0.0 | 0.0 | 0.0 | 65.5<br>19.2E | 0.0 | 0.0<br>0.0E | 0.0 | 0.0 | 172.1 | 516.9 |
| JUL | 0.0 | 170.1 | 192.5<br>56.4E | 0.0 | 0.0 | 0.0 | 82.4<br>24.1E | 0.0 | 0.0<br>0.0E | 0.0 | 0.0 | 192.5 | 578.0 |
| AUG | 0.0 | 174.8 | 193.5<br>56.7E | 0.0 | 0.0 | 0.0 | 83.4<br>24.4E | 0.0 | 0.0<br>0.0E | 0.0 | 0.0 | 193.5 | 581.2 |
| SEP | 0.0 | 99.9 | 156.5<br>45.9E | 0.0 | 0.0 | 0.0 | 49.9<br>14.6E | 0.0 | 0.0<br>0.0E | 0.0 | 0.0 | 156.5 | 469.9 |
| OCT | 36.6 | 22.0 | 126.2<br>37.0E | 0.0 | 0.0 | 0.0 | 11.3<br>3.3E | 62.2 | 4.8<br>1.4E | 0.0 | 62.2 | 188.5 | 441.4 |
| NOV | 120.6 | 0.0 | 120.5<br>35.3E | 0.0 | 0.0 | 0.0 | 0.0<br>0.0E | 205.0 | 14.0<br>4.1E | 0.0 | 205.0 | 325.5 | 566.9 |
| DEC | 156.4 | 0.0 | 127.6<br>37.4E | 0.0 | 0.0 | 0.0 | 0.0<br>0.0E | 265.9 | 17.4<br>5.1E | 0.0 | 265.9 | 393.4 | 648.9 |
| | 782.3 | 684.7 | 1720.1<br>504.0E | 0.0 | 0.0 | 0.0 | 334.6<br>98.0E | 1328.6 | 89.0<br>26.1E | 0.0 | 1328.6 | 3048.7 | 6494.1 |

NOTE-- ALL ENTRIES ARE IN MBTU EXCEPT
ENTRIES FOLLOWED BY E ARE IN MWH (THOUSANDS OF KWH)

FT BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 PDL RUN 1
BU[illegible]G 1242 BASE CASE PRESENT ENERGY USAGE
REP[illegible] PS-B MONTHLY PEAK AND TOTAL ENERGY USE WEATHER FILE- TMY RALEIGH, NC

| MO | UTILITY- | ELECTRICITY | FUEL-OIL |
|---|---|---|---|
| | TOTAL(MBTU) | 130.081 | 316.989 |
| JAN | PEAK(KBTU) | 334.615 | 1003.462 |
| | DY/HR | 5/ 7 | 16/10 |
| | TOTAL(MBTU) | 116.041 | 256.445 |
| FEB | PEAK(KBTU) | 329.611 | 958.361 |
| | DY/HR | 9/ 7 | 9/10 |
| | TOTAL(MBTU) | 123.547 | 190.763 |
| MAR | PEAK(KBTU) | 317.129 | 623.944 |
| | DY/HR | 9/ 7 | 25/ 4 |
| | TOTAL(MBTU) | 114.061 | 31.299 |
| APR | PEAK(KBTU) | 362.696 | 374.720 |
| | DY/HR | 27/18 | 1/ 5 |
| | TOTAL(MBTU) | 147.416 | 0.000 |
| MAY | PEAK(KBTU) | 424.350 | 0.000 |
| | DY/HR | 31/18 | 31/ 1 |
| | TOTAL(MBTU) | 172.112 | 0.000 |
| JUN | PEAK(KBTU) | 477.714 | 0.000 |
| | DY/HR | 27/ 7 | 30/ 1 |
| | TOTAL(MBTU) | 192.484 | 0.000 |
| JUL | PEAK(KBTU) | 461.194 | 0.000 |
| | DY/HR | 22/ 7 | 31/ 1 |
| | TOTAL(MBTU) | 193.532 | 0.000 |
| AUG | PEAK(KBTU) | 474.055 | 0.000 |
| | DY/HR | 1/ 7 | 31/ 1 |
| | TOTAL(MBTU) | 156.490 | 0.000 |
| SEP | PEAK(KBTU) | 475.166 | 0.000 |
| | DY/HR | 6/18 | 30/ 1 |
| | TOTAL(MBTU) | 126.247 | 62.247 |
| OCT | PEAK(KBTU) | 386.771 | 548.962 |
| | DY/HR | 6/18 | 16/ 2 |
| | TOTAL(MBTU) | 120.533 | 204.978 |
| NOV | PEAK(KBTU) | 327.506 | 835.851 |
| | DY/HR | 7/ 7 | 18/ 3 |
| | TOTAL(MBTU) | 127.555 | 265.873 |
| DEC | PEAK(KBTU) | 327.295 | 779.980 |
| | DY/HR | 22/ 7 | 11/ 6 |

FT BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 PDL RUN 1
BUILDING 1242 BASE CASE PRESENT ENERGY USAGE
REPORT- PS-B MONTHLY PEAK AND TOTAL ENERGY USE WEATHER FILE- TMY RALEIGH, NC
(CONTINUED)

| UTILITY- | ELECTRICITY | FUEL-OIL |
|---|---|---|
| ONE YEAR | 1720.100 | 1328.594 |
| USE/PEAK | 0.478 | 1.003 |

FT BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 PDL RUN 1
LDING 1242 BASE CASE PRESENT ENERGY USAGE
RT- PS-C EQUIPMENT PART LOAD OPERATION WEATHER FILE- TMY RALEIGH, NC

| EQUIPMENT | HOURS AT PERCENT PART LOAD RATIO | | | | | | | | | | | TOTAL HOURS | ANNUAL LOAD (MBTU) | FALSE LOAD (MBTU) | ELEC USED (MBTU) | THERMAL USED (MBTU) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 -- 10 | -- 20 | -- 30 | -- 40 | -- 50 | -- 60 | -- 70 | -- 80 | -- 90 | -- 100 | - 110+ | ----- | ------ | ------ | ------ | ------ |
| HW-BOILER | 2532 | 1328 | 260 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4123 | 782.3 | 0.0 | 68.7 | 1328.6 |
| | 2532 | 1328 | 260 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | |
| HERM-REC-CHLR | 1391 | 817 | 817 | 387 | 84 | 5 | 0 | 0 | 0 | 0 | 0 | 3501 | 684.7 | 0.0 | 310.7 | 0.0 |
| | 1391 | 817 | 817 | 387 | 84 | 5 | 0 | 0 | 0 | 0 | 0 | | | | | |

HOT LOOP CIRCULATION PUMP ELECTRICAL USE = 20.3 MBTU
COLD LOOP CIRCULATION PUMP ELECTRICAL USE = 23.9 MBTU

NOTES TO TABLE
1) THE FIRST PART LOAD ENTRY FOR EACH PIECE OF EQUIPMENT IS THE HOURLY LOAD DIVIDED BY THE HOURLY OPERATING CAPACITY

2) THE SECOND PART LOAD ENTRY FOR EACH PIECE OF EQUIPMENT IS THE HOURLY LOAD DIVIDED BY THE TOTAL INSTALLED CAPACITY

FT BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 PDL RUN 1
BUILDING 1242 BASE CASE PRESENT ENERGY USAGE
RUN 1 - PS-D PLANT LOADS SATISFIED WEATHER FILE- TMY RALEIGH, NC

| HEATING INPUTS | MBTU SUPPLIED | PCT OF TOTAL LOAD |
|---|---|---|
| HW-BOILER | 782.3 | 100.0 |
| LOAD SATISFIED | 782.3 | 100.0 |
| TOTAL LOAD ON PLANT | 782.3 | |

| COOLING INPUTS | MBTU SUPPLIED | PCT OF TOTAL LOAD |
|---|---|---|
| HERM-REC-CHLR | 684.7 | 100.0 |
| LOAD SATISFIED | 684.7 | 100.0 |
| TOTAL LOAD ON PLANT | 684.7 | |

| ELECTRICAL INPUTS | MBTU SUPPLIED | PCT OF TOTAL LOAD |
|---|---|---|
| ELECTRICITY | 1720.1 | 100.0 |
| LOAD SATISFIED | 1720.1 | 100.0 |
| TOTAL LOAD ON PLANT | 1720.1 | |

FT BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 2/21/1995 11: 6:41 PDL RUN 1
BUILDING 1242 BASE CASE PRESENT ENERGY USAGE
RE[redacted] PS-D PLANT LOADS SATISFIED WEATHER FILE- TMY RALEIGH, NC
(CONTINUED)

SUMMARY OF LOADS MET

| TYPE OF LOAD | TOTAL LOAD (MBTU) | LOAD SATISFIED (MBTU) | TOTAL OVERLOAD (MBTU) | PEAK OVERLOAD (MBTU) | HOURS OVERLOADED |
|---|---|---|---|---|---|
| HEATING INPUTS | 782.3 | 782.3 | 0.000 | 0.000 | 0 |
| COOLING INPUTS | 684.7 | 684.7 | 0.000 | 0.000 | 0 |
| ELECTRICAL INPUTS | 1720.1 | 1720.1 | 0.000 | 0.000 | 0 |

| ENERGY TYPE IN SITE MBTU - CATEGORY OF USE | ELECTRICITY | FUEL-OIL |
|---|---|---|
| SPACE HEAT | 68.66 | 1328.59 |
| SPACE COOL | 310.70 | 0.00 |
| HVAC AUX | 369.70 | 0.00 |
| DOM HOT WTR | 0.00 | 0.00 |
| AUX SOLAR | 0.00 | 0.00 |
| LIGHTS | 622.17 | 0.00 |
| VERT TRANS | 0.00 | 0.00 |
| MISC EQUIP | 242.60 | 0.00 |
| TOTAL | 1613.84 | 1328.59 |

| | | | |
|---|---|---|---|
| TOTAL SITE ENERGY | 3048.69 MBTU | 158.5 KBTU/SQFT-YR GROSS-AREA | 158.5 KBTU/SQFT-YR NET-AREA |
| TOTAL SOURCE ENERGY | 6494.06 MBTU | 337.5 KBTU/SQFT-YR GROSS-AREA | 337.5 KBTU/SQFT-YR NET-AREA |

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.0
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

# APPENDIX A

# SCOPE OF WORK

APPENDIX A
for Delivery Order No. 5
A LIMITED ENERGY STUDY OF FACILITIES IN THE HISTORIC, RED BRICK MAIN POST AREA AT FORT BRAGG, NC

1. BRIEF DESCRIPTION OF WORK:
The Architect-Engineer (A-E) shall:

1.1 Site Survey. Perform a limited site survey and investigation of specific facilities to collect all data required to determine the baseline energy consumption of the heating, cooling, and interior lighting systems in various facilities located in the historic portion of the old main post area. There are limited opportunities for conserving water, but a survey of water closets and other water consuming building components is to be performed also.

1.2 Alternatives to be Studied. Evaluate the cost-effectiveness of boiler replacement and conversion to natural gas-fired type; cooling system replacement, conversion, or centralization; building envelope improvements; and various lighting system alternatives to determine their energy savings potential, economic feasibility, and technical applicability based on present conditions and current technical criteria and Army policy.

1.3 Project Identification and Documentation. There are two possible types of projects that may result from this study, as described below in paragraph 2.4. After technical and economic evaluation, the A-E is instructed to provide complete project documentation for the most cost-effective solution(s) to improving heating, cooling, lighting, water consumption, and resistance to heat transfer through building envelopes in these facilities in either of these two project types.

1.4 Study Report. Prepare a comprehensive report to document all work performed, the results and conclusions, and all recommendations. The specifics of this report are more fully described in paragraph 6.

2. SPECIFIC INSTRUCTIONS:

2.1 Site Survey. The primary purpose of this study is to evaluate heating, cooling, lighting, and insulating systems in the twelve (12) facilities listed below:

| Building Number | Approximate Square Footage |
|---|---|

| | |
|---|---|
| 2-1105 | 94,326 |
| 2-1120 | 49,627 |
| 2-1127 | 63,448 |
| 2-1133 | 41,360 |
| 2-1138 | 72,344 |
| 1-1242 | 25,660 |
| 1-1333 | 14,304 |
| 2-1728 | 74,622 |
| 2-1731 | 72,327 |
| 1-1326 | 60,600 |
| 1-1434 | 13,500 |
| 2-1549 | 30,145 |

The site survey will include verification of facility gross square footage, heated square footage, and cooled square footage; and inventory of heating, cooling, lighting, water consuming, and building insulation systems components (e.g., number of air handlers in each building, boiler types and sizes serving the facilities, types of lighting fixtures, and other component information pertinent to the analysis). The A-E shall document his site survey on forms developed for the survey or on standard forms and shall submit these completed forms as part of the report. If any code violations related to these systems are detected during inspection, they will be documented and the Fort Bragg Energy Coordinator (FBEC) will be notified immediately.

2.3 Alternatives to be Studied.

2.3.1 Heating systems:

-- Compare (1) replacing existing oil-fired boilers with new oil-fired boilers to (2) relacing existing oil-fired boilers with natural gas-fired boilers and connecting to an 8" gas main located nearby.
-- Infrared heat where appropriate

2.3.2 Lighting system alternatives that have been identified for study and evaluation include:

-- Replacement of ballasts in existing lighting fixtures with more energy efficient type(s)
-- Replacement of existing incandescent lamps with compact flourescent with or without the use of high grade reflectors
-- Replacement of existing fluorescent lamps with more energy efficient fluorescent lamps
-- Installation of occupancy sensors in all appropriate areas
-- Altered light switching arrangements
-- Improved reflection and dispersion with light colored ceilings and walls
-- Replacement of existing esit signs with more energy efficient type

2.3.3 Building envelopes:

-- Determine whether upgrading or replacing building envelopes, to include ceiling or roof insulation, wall insulation, weatherstripping and caulking, and/or window replacement, door replacement, or energy-saving treatment of crawl spaces will meet the Savings to Investment Ratio (SIR) and payback period criteria of the energy program. The A-E will need to insure that compliance with all design criteria related to preservation of historic buildings is maintained when making energy improvement recommendations for the building envelopes.

2.3.4 Cooling system alternatives that have been identified for study and evaluation include:

--Replacement of existing equipment with more energy efficient equipment
--Centralized cooling plant to serve all the facilities

2.3.5 For water conservation analysis examine replacement of existing fixtures by water saving water closets and shower heads in all appropriate locations.

2.3.6 The A-E is strongly encouraged to suggest for study other reasonable and practical alternatives or combinations of alternatives that, in his judgment, could possibly provide the most economical means of heating, cooling, insulating, or lighting these facilities. The A-E is instructed to recommend other changes, e.g., to maintenance practices, operational procedures, or controls in these facilities, that will reduce energy consumption in these facilities. Other team members may suggest other alternatives for evaluation during the progress of this study.

2.4 Project Identification and Documentation. There will be two possible types of projects to be identified as a result of this study. Descriptions and documentation requirements for each type are presented below.

2.4.1 Identification of the first type of project, which will require further guidance from the FBEC or the FORSCOM P.O.C. on packaging for funding purposes, will concern the actual heating, cooling, insulating, or lighting system improvement or water conservation projects. Every attempt will be made to keep all projects within the Installation Commander's funding approval authority applicable to the Operations and Maintenance, Army (OMA) account. These limitations are generally $300,000 for a project classified as construction and $1,000,000 for projects classified as maintenance or repair, as defined in AR 420-10. To be classified as an OMA Energy maintenance or repair project, the project must result in needed maintenance or repair to an existing facility or replace a failed or failing system or component and result in energy savings. If the project would replace a system or component that is considered failed or failing due solely to obsolete technology or inefficiency, the system or component to be replaced must have been in use for at

least three years and the simple payback period must be ten years or less. So long as the work can be logically separated and identified, projects can be combined in one undertaking. There is a special source of OMA funding called the Federal Energy Management Program (FEMP) that can generally provide funding for energy savings type projects, the cost of which is estimated to fall below these limitations, on a one year cycle or less, if a project is properly justified. Any recommended project must have, as a minimum, a Savings to Investment Ratio (SIR) of 1.25 and a simple payback period of 10 years or less. The documentation required for each project is the life cycle cost analysis (LCCA) summary sheet completely filled out, a description of the work to be accomplished, backup data for the LCCA (i.e., energy and non-energy savings calculations and cost estimate), the SIR, and the simple payback period. The documentation of these projects will be a part of the study report described below in paragraph 6. See paragraph 3.4 for further guidance.

2.4.2 The second, and most intensive, type of project documentation is required for any project that exceeds the funding authorities shown above in paragraph 2.4.1. These are by definition Energy Conservation Investment Program (ECIP) projects. To qualify as an ECIP project, the cost estimate associated with the energy improvement must be at least $300,000. In addition to the documentation requirements shown above in paragraph 2.4.1, this will include a DD Form 1391 for each project. AR 415-15 provides specific guidance for preparing a DD Form 1391. The other documentation guidance is shown in references 9.4 and 9.8.

## 3. GENERAL

3.1 The information and analysis outlined herein are considered to be minimum requirements for adequate performance of this study.

3.2 For the buildings listed above and their installed heating, cooling, lighting, and insulating systems, all methods of energy conservation specified and any others which the A-E considers reasonable and practical shall be considered, including improvements of operational methods and procedures as well as the physical facilities. All alternatives, or other changes, that are considered during the study will be documented in the report, including those that are rejected because they are considered infeasible with reasons given for elimination.

3.3 The study shall consider the use of all energy sources applicable to each building or system and shall examine the possibility of combinations of heating, cooling, lighting, and insulation systems or other improvements if, for example, some buildings are more suited for certain types of lighting because of building orientaiton, facility utilization, or floor plan.

3.4 The "Energy Conservation Investment Program (ECIP) Guidance," described in letter from DAIM-FDF-U, dated 10 Jan 1994, and any subsequent revisions establish criteria for ECIP projects and shall be used for performing the economic analyses associated with these projects. The software program, Life Cycle Cost in Design (LCCID), has been developed for performing life cycle cost calculations in accordance with ECIP guidelines and is referenced in the ECIP guidance. If any program other than LCCID is proposed for life cycle cost analysis, it must use the mode of calculation specified in the ECIP guidance. The output must be in the format of the ECIP LCCA summary sheet, and it must be submitted for approval to the Contracting Officer. The LCCID program is available from the BLAST Support Office at 144 Mechanical Engineering Building, 1206 West Green Street, Urbana, Illinois 61901 for a nominal fee. The telephone number is (217) 333-3977 or (800) 842-5278.

3.5 Computer modeling will be used to determine the energy savings of alternatives which would replace or significantly change an existing heating, cooling, or insulating system. Modeling will be done using a professionally recognized and proven computer program or programs that integrate architectural features with heating or cooling systems. These programs will be capable of simulating the features, systems, and thermal loads of the buildings under study. The program will use established weather data files and may perform calculations on a true hour-by-hour basis or may condense the weather files and number of calculations into several "typical" days per month. The program to be used by the A-E will be submitted for approval with a sample run, an explanation of all input and output data, and a summary of program methodology and energy evaluation capabilities, unless it is one of the following: Building Loads and System Thermodynamics (BLAST), DOE 2.1E, Carrier E20 or Hourly Analysis Program (HAP), Trane Air-Conditioning Economics (TRACE).

3.6 The A-E shall take great care to insure that the FBEC is kept apprised of the ongoing work, is regularly consulted from beginning to end, and has every opportunity to input his thoughts and guidance into the study process. The alternatives that become the final recommended projects will be acceptable to the FBEC and will be both technically and economically feasible.

3.7 Public Disclosures. The A-E shall make no public announcements or disclosures relative to information contained or developed in this contract, except as authorized by the Contracting Officer.

3.8 Meetings. Meetings will be scheduled whenever requested by the A-E or the government's representative acting for the installation project manager for the resolution of questions or problems encountered in the performance of the work. These meetings, if necessary, will be in addition to the scheduled review meetings and presentations.

3.9 Site Visits, Inspections, and Investigations. The Contractor shall visit and inspect/investigate the site of the project as necessary and required during the preparation and accomplishment of the work. Visits will be coordinated with the FBEC at least a week in advance. The Contractor will determine whether any special security clearances are required with the assistance of the FBEC.

3.10 All invoices or payment estimates (ENG Form 93) will be sent to the Savannah District project manager, who is identified below in paragraph 5.4, for review and approval.

3.11 Records

3.11.1 The A-E shall provide a record of all significant conferences, meetings, discussions, verbal directions, telephone conversations, etc., with government personnel relative to this project in which the A-E has participated. These records shall be dated and shall identify the contract number, participating personnel, subject discussed and conclusions reached. The A-E shall forward by letter to the list of P.O.C.'s in paragraph 5 within ten calendar days a reproducible copy of the records. These will also be included in the study report as an appendix.

3.11.2 The A-E shall provide a record of requests for and/or receipt of Government-furnished material, data, documents, information, etc., which if not furnished in a timely manner, would significantly impair the normal progression of the work under this contract. The records shall be dated and shall identify the contract number. The A-E shall forward to the Savannah District project manager within ten calendar days a reproducible copy of the record of request or receipt of material.

3.12 Interviews. The A-E and Savannah District project manager shall conduct entry and exit interviews with the Director of Public Works and Environment (DPWE), or his designated representative, before starting work at the installation and after completion of the field investigation phase.

3.12.1 Entry. The entry interview shall describe the purpose of the study, the intended procedures for the survey, schedule, names of personnel performing the field investigation and the A-E's project manager, support required by the A-E of the DPWE staff, a description of the final products, and any other information the A-E wishes to communicate and shall be conducted prior to commencing work at the installation.

3.12.2 Exit. The exit interview shall briefly describe the items surveyed, an initial assessment of the condition of existing systems, and the most likely alternatives that will be further analyzed.

4. SERVICES AND MATERIALS. All services, materials (except those specifically enumerated to be furnished by the Government), plant, labor (including that required to research installation records or databases to obtain all information needed to perform a thorough study), supervision, and travel necessary to complete the work and render the data required under this delivery order (D.O.) are to be included in the lump sum price.

5. PROJECT MANAGEMENT

5.1 The A-E shall designate a project manager to serve as the point of contact and liaison for work required under this delivery order (D.O.). Upon award of this D.O., the individual shall be immediately designated in writing. The A-E's designated project manager shall be approved by the Contracting Officer prior to commencement of work. This designated individual shall be responsible for coordination of work required under this D.O. The A-E's project manager shall submit monthly progress reports, typically in conjunction with pay requests, and shall telephonically update the Savannah District project manager on project events about every two weeks between pay requests. Immediately upon award of the D.O., the A-E's project manager will submit a project schedule substituting dates for calendar days, with an assumed 30 day government review period after each submittal.

5.2 The Fort Bragg Energy Coordinator and project manager for this effort is Sam Musulin, telephone number (910) 396-1920, FAX number (910) 396-1725. He will assist the A-E in obtaining information and establishing contacts necessary to accomplish the work required under this contract.

5.3 The Forces Command program manager is Naresh Kapur, telephone number (404) 669-5327, FAX number (404) 669-7751.

5.4 The Corps of Engineers, Savannah District, project manager is Rob Callahan, telephone number (912) 652-5246, FAX number (912) 652-5442.

5.5 The Corps of Engineers, Savannah District, Contracting Officers Representative is Ira D. Hefner, telephone number (912) 652-5364, FAX number (912) 652-5442.

5.6 The Corps of Engineers, Mobile District, is the Army's designated Technical Center of Expertise for the EEAP. Mobile District's program manager is Tony Battaglia, telephone number (205) 690-2618, FAX number (205) 690-2424.

6. SUBMITTALS, PRESENTATIONS, AND REVIEWS.

6.1 General. The work accomplished shall be fully documented by a comprehensive report. While the cost of report reproduction is certainly a consideration, the three submittals must be well organized and lend themselves to easy review. The

interim submittal may be copied and bound in the most convenient and least expensive manner, so long as it meets the two criteria above. The pre-final report will be organized, tabbed, copied and bound in the exact manner which the Contractor proposes to produce the final report. Review of this submittal will include comments on the report's organization and flow of thought. The final report will incorporate all earlier comments and, if the pre-final report is produced properly, will be produced by page for page replacement or page addition in the pre-final report. A high quality 3-ring binder will be used to package the pre-final report. For easy reading line length on the printed page is a consideration. It may be adviseable to use a two column format to accomplish this. The pages of the original copy will be laser printed. Xeroxed copies on high quality copy paper is acceptable so long as there is essentially no discernible difference between them and the original. A title page will be inserted in a sleeve on the front cover and will contain a photograph descriptive of the report contents. The inside title page will also incorporate logos and credits to the A-E and the offices who have played a role in development of the study and report. This will be followed by a table of contents. Each section, subsection, and appendix shall be separated by a thick paper divider tabbed with the section name and number. Each page will be numbered with a section number followed by a dash and a page number. A separately bound Executive Summary of the study, giving a brief overview of the conclusions and recommendations using graphs, tables, and charts as much as possible, will be prepared. For clarity, color will be used in these graphic elements or any others that appear in the report. The body of the report itself, that portion where the technical analysis, conclusions, and recommendations are developed, shall be organized in a logical manner, written simply enough for a person not an expert in the field to follow the line of reasoning for each project. All project documentation will be presented in this portion of the report. Appendices will include as a minimum the Scope of Work, meeting minutes, survey forms, and code violations found. Any other appendices that the A-E thinks will assist in making the report better and more organized are also encouraged. There will be a list of acronyms used with definitions.

6.2 Interim Report Submittal. An interim report containing all the sections described above, except the Executive Summary, shall be submitted for review after the field survey has been completed and the heating, cooling, insulation, water, and lighting systems analyses have been performed. The report shall indicate the work which has been accomplished to date, illustrate the methods and justifications of the approaches taken, and contain a plan for the work remaining to complete the study. All alternatives that have been identified for study shall be included. For those that are recommended for elimination from further study reasons for their elimination shall be given. The A-E shall make a presentation of the report at a review conference. Visual aids or other methods of presentation will be at the A-E's discretion to make understanding by those present

easier. One copy each shall be submitted for review to the FORSCOM and Mobile District P.O.C.'s. Two copies each of the report, and one copy of a separately bound notebook of survey forms only, shall be submitted to the Fort Bragg and Savannah District P.O.C.'s. Review comments at this stage of report development will include those pertinent to packaging of projects for funding purposes.

6.3 Prefinal Report Submittal. The A-E shall prepare and submit the prefinal report when all work under this contract is essentially complete. The report will be formatted and bound exactly as the A-E proposes to format the final report. All project documentation shall be completed and included in the report. All comments resulting from review of the interim submittal or from the presentation shall have been addressed in compiling this report, and review action comments related to the interim report shall be included in a separate appendix keyed to sections of the pre-final report where the appropriate changes have been made. The same number of copies shall be sent to the same offices as specified above for the interim report.

6.4 Final Submittal. Any revisions or corrections resulting from comments made during the review of the pre-final report will be able to be incorporated by page for page replacement or page addition in the pre-final report, if it has been produced in accordance with these instructions. All instructions on organization and formatting shall be strictly followed. A separately bound Executive Summary will be prepared, as described above in paragraph 6.1. One copy of the final submittal shall be sent to the FORSCOM and Mobile District P.O.C.'s; two copies shall be sent to the Savannah District P.O.C.; and three copies, along with the original, shall be sent to the Fort Bragg P.O.C. In addition one copy each of only the Executive Summary shall be sent to the Corps of Engineers, South Atlantic Division, P.O.C., the U.S. Army Logistics Evaluation Agency P.O.C., and to the HQUSACE P.O.C. listed below in paragraph 8.

7. PROJECT SCHEDULE

| Milestone | Date |
|---|---|
| Entry interview and begin field work | NLT 14 days after NOA of this D.O. |
| A-E calls in code violations (if any) | As soon as they are discovered |
| A-E submits interim report | NLT 120 days after entry interview |
| Interim submittal review meeting and presentation | NLT 30 days after submittal |

| | |
|---|---|
| | of interim report |
| A-E submits pre-final report | NLT 60 days after receipt of government review comments on interim |
| A-E submits final report inserts | NLT 30 days after receipt of government review comments on pre-final |

8. ADDRESSES:

Commander
XVII Airborne Corps and Fort Bragg
ATTN: AFZA-PW-M (Mr. Sam Musulin)
Fort Bragg, NC 28307-5000

Commander
U.S. Army Forces Command
ATTN: AFPI-ENO (Mr. Naresh Kapur)
Fort McPherson, GA 30330

Savannah District, Corps of Engineers
ATTN: CESAS-PM-MP (Mr. Rob Callahan)
100 W. Oglethorpe Avenue
P.O. Box 889
Savannah, GA 31402-0889

Mobile District, Corps of Engineers
ATTN: CESAM-EN-CM (Mr. Tony Battaglia)
P.O. Box 2288
Mobile, AL 36628-0001

Commander
U.S. Army Engineer Division, South Atlantic
ATTN: CESAD-EN-TE (Mr. Baggette)
77 Forsyth Street, SW
Atlanta, GA 30335-6801

Commander
U.S. Army Corps of Engineers
ATTN: CEMP-ET (Mr. Gentil)
20 Massachusetts Avenue, NW
Washington, DC 20314-1000

Commander
U.S. Army Logistics Evaluation Agency
ATTN: LOEA-PL (Mr. Keath)
New Cumberland Army Depot

New Cumberland, PA 17070-5007

9. REFERENCES:

9.1 Architect and Engineer Instructions, 9 Dec 91

9.2 AR 420-10, Management of Installation Directorates of Engineering and Housing, 2 Jul 87

9.3 AR 415-15 (DRAFT), Army Military Construction Program Development and Execution

9.4 Energy Conservation Investment Program (ECIP) Guidance, 10 Jan 94

9.5 TM 5-785, Engineering Weather Data

9.6 TM 5-800-4, Programming Cost Estimates for Military Construction, Feb 94

9.7 General Energy Conservation Opportunities

9.8 Required DD Form 1391 Data

9.9 AR 11-27, Army Energy Program, 14 July 89

9.10 TWX dated 111600Z Jul94 from DAIM-FDF-B, subject: Future Change to AR 420-10

# APPENDIX B

# CORRESPONDENCE

SYSTEMS corp
SYSTEMS ENGINEERING AND MANAGEMENT CORPORATION



September 28, 1994

Savannah District, Corps of Engineers
ATTN: CESAS-PM-MP (Mr. Rob Callahan)
100 West Oglethorpe Avenue
P. O. Box 889
Savannah, GA 31402-0889

Dear Mr. Callahan:

RE: Lighting Field Survey Meeting Minutes
Limited Energy Study of Facilities in the Historic, Red Brick Main Post Area and Hangars at Simmons Army Airfield at Fort Bragg, NC
Contract No. DACA01-94-0034

The lighting field survey at Fort Bragg was conducted from 20 September through 23 September 1994. The following is a description of the topics discussed and decisions reached during the field survey:

**Tuesday, September 20, 1994**
Persons Present:

| | |
|---|---|
| Rob Callahan | Savannah District COE |
| Naresh Kapur | Forces Command Representative |
| Sam Musulin | Fort Bragg DPW Energy Officer |
| Tommy Brown | Fort Bragg Airfield Commander |
| Julie Hollensbe | Systems Corp Project Manager |
| M. Wallace Green | Systems Corp Representative |

- Julie Hollensbe passed out a detailed scheduled of the projects to be performed on the Red Brick area and the Airfield.
- Tommy Brown will escort Systems Corp through all the Airfield buildings included in the scope of work.
- Sam Musulin will provide Systems Corp with an access letter, 12 months of electric bills and the drawings available on the buildings included in the scope of work.
- Naresh Kapur passed out a brochure on a sky light product he would like evaluated on the hangars.
- The airfield personnel are concerned with the risk of adding sky lights to the hangars and damaging the roofs due to the expensive equipment and material stored in the hangars.

- Systems Corp will look for addition future energy projects while surveying.
- The basement of the installation headquarter's building will be the only floor surveyed in this building (Bldg 1326) due to the controlled access.
- The exit interview will follow the second field survey trip in October when all field survey work is completed.

**Friday, September 23, 1994**

Persons Present:

| | |
|---|---|
| Sam Musulin | Ft. Bragg Energy Officer |
| Mr. Walker | Ft. Bragg High Voltage Crew |
| Julie Hollensbe | Systems Corp Project Manager |
| M. Wallace Green | Systems Corp Representative |

- High pressure sodium lamps in the hangars are 250 watt.
- Metal halide lamps in the hangars are 400 watts.
- Mercury vapor lamps in the hangars are 1000 watts.
- Incandescent lamps in the high bay hangars are 750 and 1000 watts.
- The exterior lamps on the buildings are 400 watt mercury vapor and 250 watt high pressure sodium.
- The street lamps along the perimeter of the airfield are a mixture of 250 and 400 watt high pressure sodium.
- Sam Musulin wants Systems Corp to evaluate replacing the mercury vapor and incandescent fixtures at the hangars with metal halide and not high pressure sodium.

If you have any questions or comments regarding this material, please do not hesitate to contact me at (708) 462-9150.

Sincerely,

SYSTEMS CORP

Julie Hollensbe, E.I.T.

cc: Sam Musulin, AFZA-PW-M
Naresh Kapur, AFPI-ENO
Tony Battaglia, CESAM-EN-CM
Greg Loflin, Systems Corp (Knoxville)

SYSTEMS corp
SYSTEMS ENGINEERING AND MANAGEMENT CORPORATION

October 12, 1994

Savannah District, Corps of Engineers
ATTN: CESAS-PM-MP (Mr. Rob Callahan)
100 West Oglethorpe Avenue
P. O. Box 889
Savannah, GA 31402-0889

Dear Mr. Callahan:

RE: Clarification to Lighting Field Survey Meeting Minutes
Limited Energy Study of Facilities in the Historic, Red Brick Main Post Area and Hangars at Simmons Army Airfield at Fort Bragg, NC
Contract No. DACA01-94-0034

The minutes from the Lighting Field Survey was distributed on 28 September 1994. The following are clarifications to the Lighting Field Survey Meeting Minutes:

- Sam Musulin, of Fort Bragg DPW, will assist in the collection of facility drawings.
- The basement of the Headquarter's Building, bldg , will be evaluated for the lighting ECOs. The entire building will be evaluated for all other ECOs.
- The hangars at Simmons Army Airfield will be evaluated for the installation of skylights. It is the decision of the installation the applicability of energy conservation opportunities. Systems Corp was only communicating the concerns of the building occupants.
- The light meters used by Systems Corp are rated to be within .5% of the actual footcandles.
- The Defense General Supply Center's (DGSC) February 1994 High Efficiency Lighting Catalog includes the sky lighting product suggested by Naresh Kapur of Forces Command.

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Telephone (615) 521-6536 Fax (615) 524-7514

- Systems Corp determines the approximate amount of daylight and artificial light by taking light level readings during the day with the lights on and off. This is only to get a general idea of the benefits of additional lighting controls and/or sky lights. The amount of hours a facility can benefit from daylighting controls or skylights is determined through historical weather data. The historical weather data is then used to calculate the proposed savings for each facility.

If you have any questions or comments regarding this material, please do not hesitate to contact me at (708) 462-9150 or Greg Loflin at (615) 521-6536.

Sincerely,

SYSTEMS CORP

Julie Hollensbe, E.I.T.

cc: Sam Musulin, AFZA-PW-M
Naresh Kapur, AFPI-ENO
Tony Battaglia, CESAM-EN-CM
Greg Loflin, Systems Corp (Knoxville)

SYSTEMS corp
SYSTEMS ENGINEERING AND MANAGEMENT CORPORATION

November 2, 1994

Savannah District, Corps of Engineers
Attention: CESAS-PM-MP (Mr. Rob Callahan)
100 West Oglethorpe Avenue
P.O. Box 889
Savannah, GA 31402-0889

Dear Mr. Callahan:

RE: HVAC Field Survey Exit Interview
Limited Energy Study of Facilities in the Historic, Red Brick Main Post Area and Hangars at Simmons Army Airfield at Fort Bragg, NC
Contract No. DACA01-94-0034

The HVAC, envelope and water field survey at Fort Bragg was conducted from 24 October through 28 October 1994. The following is a description of the topics discussed and decisions reached during the field survey:

Thursday October 27, 1994
Persons Present:

| | |
|---|---|
| Sam Musulin | Fort Bragg DPW Energy Officer |
| Tommy Brown | Fort Bragg Airfield Commander |
| Greg Loflin | Systems Corp Project Manger |
| M. Wallace Green | Systems Corp Representative |
| Jonathan Driskill | Systems Corp Representative |
| Bruce Yates | Systems Corp Representative |

- Accurate drawings or manufacturer's data for existing HVAC systems are not available for many of the buildings under consideration, particularly in the Red Brick area. Some assumptions will be made based on the information gathered during the site survey.

- Boiler systems were not operating in most facilities during the survey. However, visual inspection and manufacturer's data will provide information as to operating efficiencies.

- Systems Corp representatives will make a return trip to Fort Bragg in mid-November to gather more information as necessary.


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Telephone (615) 521-6536 Fax (615) 524-7514

- Sam Musulin will provide operational and maintenance cost data for each of the buildings under study as quickly as possible.

- The distance from Simmons Army Airfield to the nearest natural gas line which could provide service to the area is over three miles.

- Code violations reported:

  (1) Storage of cleaning chemicals in mechanical rooms used as plenum returns in three mechanical rooms of the Headquarters Building (1-1326).

  (2) Few, if any, of the HVAC Systems in the Red Brick Area meet ASHRAE ventilation requirements for minimum outdoor air flow rates based on occupancy.

  (3) Several mechanical rooms have no working light fixtures.

If you have any questions or comments regarding this material, please do not hesitate to contact me at (615) 521-6536.

Sincerely,

SYSTEMS CORP

Gregory B. Loflin
Project Manager

GBL:jal

cc: Sam Musulin, AFZA-PW-M
Naresh Kapur, AFPI-ENO
Tony Battaglia, CESAM-EN-CM

# APPENDIX C

# RESPONSE TO REVIEW COMMENTS

# RESPONSE TO INTERIM REVIEW COMMENTS

| Project Review Comments | Interim √ | Project: | **Limited Energy Study of Historic Red Brick Main Post Area** | Reviewer: | COE-SAVANNAH DISTRICT | Page: 1 of 1 |
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| | Pre-Final ☐ | Location: | **Fort Bragg, NC** | Name: | FULTON | Date: 2/03/95 |
| | Final ☐ | Year: | **P.N.** | Organizer: | | |

| Comment No. | Vol. | Sec. | Page | COMMENTS ☐ Struc. ☐ Arch. ☐ Civ. ☐ Mech. ☐ Elec. ☐ San. ☐ Env. ☐ Fire ☐Other | Action Code | RESOLUTIONS (include location of documents) | Ref. |
|---|---|---|---|---|---|---|---|
| 1 | | ECO-1 | | The report is very well done. ECO-1 should concentrate on the replacement of Exit Lights with LEDs and replacement of incandescent with fluorescent and compact fluorescent. | A | Concur. | |
| 2 | | ECO-2 | | Should be abandoned as hopeless. | A | Concur. | |
| 3 | | ECO-3 | | Is an excellent opportunity to realize real savings at a modest cost. | A | Concur. | |
| 4 | | ECO-4 | | Has the greatest pay-off of all, and this reviewer highly recommends it. | A | Concur. | |
| 5 | | ECO-5 | | Should not be considered further; outside of prescribed parameters. | A | Concur. | |
| 6 | | ECO-6 | | Should be the subject of a building-by-building analysis. Some buildings can benefit from new HVAC systems, while others are very marginal. | N | ECO-6 was performed as a building-by-building analysis. | |
| 7 | | ECO-7 | | Should not be considered further. | A | Concur. | |

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A - Accepted/Concur D - Action Deferred N - Non-concur VE - VE Potential/VEP Attached W - Withdrawn

| Project Review Comments | Interim √ | Project: | Limited Energy Study of Historic Red Brick Main Post Area | Reviewer: HQ FORSCOM | Page: 1 of 3 |
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| | Pre-Final ☐ | Location: | Fort Bragg, NC | Name: NARESH K. KAPUR P.E. | Date: 2/16/95 |
| | Final ☐ | Year: | P.N. | Organizer: | |

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|---|---|---|---|---|---|---|---|
| 1 | Field Notes | 1 | 1 | Not clear if ballasts are magnetic or electronic. | A | All existing ballasts are magnetic. | |
| 2 | Field Notes | 1 | 5 | Hours of operation - 10. How many days a week? How many hours a year? Corridors/latrines are expected to be lighted for more hours. Please clarify in the Field Notes wherever similar situations exist. | A | Field Notes have been modified to make information clearer. | |
| 3 | Field Notes | 1 | 15 | In Building 1728, one office has 23 fixtures - 2x4 - four lamps each. Lighting levels of 100-125 FC are indicated. Any special treatment for this area? Similar situation may exist in other buildings. | A | Field Notes have been modified to make information clearer. | |
| 4 | Field Notes | 1 | 29 | For water closets, two GPF is indicated. How was this figure determined? | A | Existing water usage was determined by manufacturer's data from flush valves. | |
| 5 | 1 | --- | --- | General. As far as possible, give brief (or abbreviated) title following ECO numbers. This applies to Table of Contents and various tabulations also. | A | Titles have been modified. | |
| 6 | 1 | 2 | 14 | For ECO-6, please evaluate all HVAC systems including those less than five (5) years old. Check if equipment is oversized. If there is potential for a cost effective retrofit/replacement, we can program for a future fiscal year. | A | Systems were analyzed for over sizing, general condition, and performance. | |

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|---|---|---|---|---|---|---|---|
| 7 | 1 | 3 | 1 | Expanded description would be preferred to what is currentiy provided. This is particularly the case with lighting ECOs. It may involve different solutions in different areas. As such, each sub-ECO should be separately dealt with, e.g. lighting in corridors, offices, bath rooms have different requirements (hrs, FC, etc.). It would help to include general observations about field conditions. Address the questions like if delamp would be practical or replacement of 2-lamp fixtures by one lamp fixtures is viable? If possible, provide catalog cuts/pictures of the proposed retrofits. In short, ECO description should be a gist of architectural engineering observations in the field and proposed solutions thereof. | A | Descriptions of ECOs have been expanded. | |
| 8 | 1 | 3 | 5 | Is 5% design cost realistic? Let us discuss. | A | Based on Interim Review discussions, no change is necessary. | |
| 9 | 1 | 3 | 7 | For compact fluorescent, material and labor cost of $2.00 is mentioned. Please verify and follow up if necessary. | A | Cost is for replacement compact fluorescent lamp currently available through the General Supply Agency. | |
| 10 | 1 | 5 | 22 | We like to see a sort of all ECOs by building number which meet the ECIP criteria. | A | See *Table 5.4.4.* | |
| 11 | 2 | 6 | --- | Most of buildings do not meet ECIP criteria for lighting ECO. Suggest Architect Engineer explore a more reasonable way of estimating lighting retrofit. Instead of considering demolition and installation as separate operations, consider it as a single operation. Economy of scale will result in a lower unit cost. Also, consider doing separate LCCAs for different functional areas like corridors, offices, etc. If individual sub-ECOs qualify, we can recommend these and look at other alternatives for those failing ECIP criteria test. | A | Lighting ECOs have been further subdivided for analysis. See *Sections 5* and *6.* | |

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| | | | | Name: NARESH K. KAPUR P.E. | Date: 2/16/95 |
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|---|---|---|---|---|---|---|---|
| 12 | --- | --- | --- | Let us make this review process a cooperative effort which should result in an end product we all can be proud of. With that in mind, Systems Corp is requested to respond in detail as to what and how the follow-up actions will be taken to satisfy the review comments. We are willing to work with Systems Corp to make it happen. The lessons learned and most of the improvements made in one EEAP study should be used in future FORSCOM studies as far as practical. | A | Concur. | |
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| | Pre-Final ☐ | Location: | **Fort Bragg, NC** | Name: SAM MUSULIN | Date: 2/06/95 |
| | Final ☐ | Year: | **P.N.** | Organizer: | |

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|---|---|---|---|---|---|---|---|
| 1 | 1 | Field Notes | | Table of Contents - Building Envelope, Water, HVAC, and Central Chiller ECO's are lumped together under HVAC survey forms unlike the description given on page 2-14 of Volume 1 of Interim Report. | A | Field Notes and Table of Contents have been broken out by HVAC, Water and Building Envelope sections. | |
| 2 | 1 | Table 5.3.3.1 | | Delete Building 1-1326 from consideration for water conservation. This is the Headquarters Building. Recalculate ECO-3 for remaining tables. Will discuss further at meeting on Feb. 22, 1995. | W | On further discussion at the Interim Review meeting it was decided to leave Building 1326 in the calculations. | |
| 3 | 1 | Table 5.4.4 | | Building 2-1549 is listed twice - for gas and oil. | A | For Building 2-1549, ECO-5 has been removed from the Recommended Table. | |
| 4 | 2 | | 6-78 | Electronic ballasts will cause problems at a telephone switching facility. Suggest deletion from lighting upgrade candidate list. | A | Building 1-1434 has been deleted for consideration in this ECO. | |
| 5 | 2 | | 6-112 | Incandescent, MV, and Exit Sign retrofit can be lumped into one project under ECO-1. | A | ECO-1 has been broken into further sub-ECOs as requested. | |
| 6 | 2 | | 7-1 | None of these ECOs panned out together. How about separately, i.e. roof insulation for all buildings, etc.? | A | ECOs have been reanalyzed separately. See *Section 5.3.2.* | |

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|---|---|---|---|---|---|---|---|
| 7 | 2 | | 11-1 | First line should read ECO-6. | A | Has been corrected. | |
| 8 | 2 | 11 | | ECO-6 for Buildings 1-1242 and 2-1127 are very close to qualifying..... | A | Cost estimates for these buildings have been corrected. | |
| 9 | | General | | Good working *scopes of work* would be valuable for all qualifying ECOs. More verbal detail on work to be accomplished for each ECO is needed. | A | Descriptions of each ECO have been expanded. See *Section 5.3.* | |
| 10 | 2 | 11 | | We will need specifics on equipment modeled for replacement. The MeansData for Lotus doesn't show this, e.g., the KW / ton rating on the chiller for Building 2-1728. | A | Expanded ECO descriptions cover these areas. See *Section 5.3.* | |
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|---|---|---|---|---|---|---|---|
| 1 | 1 | 2 | | *Section 2* needs some reorganization. As it is presently submitted, it is not easy to follow. Also, combine *Tables 2.3.1.1* through *2.3.7.1* into one table summarized in a matrix. A copy of the tables in *Section 5.3* should be included in *Section 6 through 12* for easy reference. A suggested organization of *Section 2* is as follows:<br><br>*Section 2.1 - Field Survey, Table 2.1.1.1*<br>*Section 2.3 - ECOs, Table 2.3.1, Matrix Table*<br>*Section 2.2 - Baseline Energy, Tables 2.2.1.1* through *2.2.3.1*<br>*Section 2.4 - Field Notes* | N | Customer comments at Interim Review meeting were in favor of keeping report organization as presented at Interim. | |
| 2 | 1 | 2 and 5 | | Define baseline energy consumption in terms of fuel sources. | N | Customer wants extraneous information kept tc a minimum in report body. Detailed information can be found in Volume 2 if needed. | |
| 3 | 1 | 2 | 2-15 | What were the different options involved in ECO 6. | | *Table 5.3.6.1* gives building-by-building description of analysis. | |
| 4 | 1 | 5 | 5 | Suggest putting the appropriate table after each narrative. See Comment #1. A table was not provided for ECO-2. | A | Has been corrected; table is provided for ECO-2. | |
| 5 | 1 | 5 | 5-23 | Project grouping should only include the recommended ECOs in *Table 5.4.2.* | A | Concur. | |
| 6 | 2 | 7 | | Provide one sample calculation to show how you computed the energy figures shown in the LCCA based on the computer output shown. | A | See new *Section 13* with sample DOE 2 input and output. | |

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|---|---|---|---|---|---|---|---|
| 7 | 2 | 8 - ECO-3 | | How were the existing and proposed liters/flush determined? Also, include all the assumptions made. Provide backup calculations for annual dollar savings and cost estimates. The number of fixtures shown for Building 1-1333 does not agree with the number shown in *Table 5.3.3.1.* This comment applies to both the urinal and water closet ECOs. | A | Existing water usage was determined by manufacturer's data for each flush valve. Proposed usage is based on new valve's consumption data. Calculations are provided in *Section 8.* Fixture numbers have been corrected for Building 1-1333. | |
| 8 | | 8 - ECO-3 | | How were the existing and proposed usage determined? Also, include all the assumptions made. Provide backup calculations for annual water and oil dollar savings and cost estimates. Since this portion of ECO-3 was not recommended, it should not be included in the overall ECO-3 evaluation. All discrete portions of an overall ECO must be recommended ECOs. | A | Existing water usage was determined by manufacturer's data. Proposed usage is based on new faucet's consumption data. Calculations are provided in *Section 8.* | |
| 9 | | 8 - ECO-3 | | How was the existing and proposed usage determined? Include all the assumptions made. Provide backup calculations for annual water and oil dollar savings and cost estimates. | A | Existing water usage was determined by manufacturer's data for each flush valve. Proposed usage is based on new valve's consumption data. Calculations are provided in *Section 8.* | |
| 10 | | 9 - ECO-4 | | Provide one sample calculation to show how you computed the energy figures shown in the LCCA based on the computer output shown. The LCC sheet for Building 1-1333 is incomplete. | A | See new *Section 13* with sample DOE 2 input and output. LCCA for Building 1-1333 has been corrected. | |
| 11 | | 10 - ECO-5 | | Provide one sample calculation to show how you computed the energy figures shown in the LCCA based on the computer output shown. | A | See new *Section 13* with sample DOE 2 input and output. | |
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|---|---|---|---|---|---|---|---|
| 12 | | 11 - ECO-6 | | Provide one sample calculation to show how you computed the energy figures shown in the LCCA based on the computer output shown. The cost estimate for controls shows a cost for DDC. The controls shall be the COEs standard single loop digital controls. | A | See new *Section 13* with sample DOE 2 input and output. The estimate for controls is simply a cost estimate for study purposes, which will be the most costly method available. The particular details of control methods can be instituted at the time of design. | |
| 13 | | 12 - ECO-7 | | Provide one sample calculation to show how you computed the energy figures shown in the LCCA based on the computer output shown. | A | See new *Section 13* with sample DOE 2 input and output. | |
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| Project Review Comments | Interim √ | Project: | Limited Energy Study of Historic Red Brick Main Post Area | Reviewer: | COE - MOBILE DISTRICT | Page: 1 of 1 |
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| | Pre-Final ☐ | Location: | Fort Bragg, NC | Name: | ROBERT S. WOODRUFF | Date: 2/06/95 |
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|---|---|---|---|---|---|---|---|
| 1 | | ECO-2 | | The end result of the energy usage calculations is presented but the actual calculations are not. Please present at least the input data so that the estimated energy savings can be evaluated for accuracy. | A | Expanded descriptions of ECOs have been included in Pre-Final submission. Also, a sample DOE 2 input and output file has been included. (*See Section 13.*) | |
| 2 | | ECO-3 | | The initial costs to install water saving water closets and urinals is too low which in turn makes this ECO look good. Please provide backup data for the costs used in the economic calculations. | N | The costs are for new flush valves only, not for new fixtures. | |
| 3 | | ECO-4 | | The data presented is only the results of the energy calculations, please submit the actual calculations themselves. | A | Expanded descriptions of ECOs have been included in Pre-Final submission. Also, a sample DOE 2 input and output file has been included. (*See Section 13.*) | |
| 4 | | ECO-5 | | Again only the calculation results are contained in the study and therefore cannot be verified. | A | Expanded descriptions of ECOs have been included in Pre-Final submission. Also, a sample DOE 2 input and output file has been included. (*See Section 13.*) | |
| 5 | | ECO-6 | | This option grouped together three (3) HVAC improvements. It seems reasonable that each type of improvement should be run individually against each building if it is applicable to that building. | N | Each HVAC improvement was run individually as it applied to each building. | |
| 6 | | ECO-7 | | How were the individual building energy savings calculated? Only the calculation results are shown. | A | Expanded descriptions of ECOs have been included in Pre-Final submission. Also, a sample DOE 2 input and output file has been included. (*See Section 13.*) | |

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# RESPONSE TO PRE-FINAL REVIEW COMMENTS

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|---|---|---|---|---|---|---|---|
| 1 | | | | We requested evaluation of all HVAC systems less than five years. What was the result of these evaluations? | A | All systems were evaluated based on general condition, performance and proper sizing. Systems which could be improved from an energy efficiency and/or maintenance viewpoint were analyzed under this ECO. Other systems which did not meet this criteria were not evaluated for this ECO, as the stated criteria was the basis for the analysis. The result was that the systems could not be recommended for replacement on the basis of energy savings or maintenance savings. | |
| 2 | | | | It is not clear if $2.00 represents the cost of material and labor, as per the column reading. Please clarify and make changes as necessary. | A | The cost represents material and labor as indicated. | |
| 3 | | | | Systems Corp is commended for their efforts to dig into ECO-1 and make it look better. Somehow we should be able to identify the areas in each building where these retrofits will be used. Cross referencing will make this very user friendly. How can this be handled? Also, see Comment 10. | A | Lighting Field Notes have been modified to indicate building area and proposed fixture replacement as requested at the Interim Review Meeting. | |
| 4 | | Executive Summary | 1-2 1-3 | For ECO-3, ECO-4, and ECO-6, provide investment costs similar to ECO-1. | A | Investment costs were added to sections as requested. | |
| 5 | | Executive Summary | 1-8 1-9 | Replace heading ECO number by ECO Number/Title. For example ECO-4 will be replaced by 4/NG HTG. ECO-3 Water Conservation needs to be included in this table. Similar changes are desirable in similar tables to make them user friendly. Wherever appropriate, provide overall dollar figures, overall SIR, and overall simple pay back at the bottom of the table. | A | *Table 1.1.2* on pages 1-8 and 1-9 modified to be more user friendly and ECO-3 added to the Table. | |
| 6 | | Executive Summary | 1-12 1-13 | See Comment 5. | A | *Table 1.1.4* on pages 1-12 and 1-13 modified as requested. | |
| 7 | | Executive Summary | 1-14 | What is the use of this table? We would rather have recommended ECOs overall figures. | A | Modifications made as requested. | |

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|---|---|---|---|---|---|---|---|
| 8 | | 5 | | Add abbreviated ECO title following ECO # in headings as well as columns of the tabulations. | A | Tables in *Section 5* modified as requested. | |
| 9 | | 5 | 5-23 5-24 | Include ECO-3. If ECOs are non-competing, provide overall dollar, SIR, and payback at the bottom of the table. | A | Tables modified as requested. | |
| 10 | | 6 | | It is not very clear what parts of the building are included in each sub-ECO. Table of Contents can be modified for this purpose. For example, we could add (corridors, bath rooms, and stair areas, etc) following Life Cycle Cost Analysis for Building...., ECO..... | N | Sub-ECOs are based on schedule of use and number of hours per day and week as indicated on page 6-1. Reference Field Notes. | |
| 11 | | 6 | | During last interim review meeting, Systems Corp Rep was shown one-lamp fluorescent fixtures at 12-16 feet C/C in a corridor of Moon or Hardy Hall at Fort Bragg. Everyone in the group was impressed by that energy efficient layout of that corridor lighting. Has that kind of possibility been considered or used in the analysis of lighting in these buildings' corridors, if applicable? | A | This has been considered where applicable. | |
| 12 | | 11 | 11-1 | First line. Replace ECO-11 by ECO-6. | A | Correction completed as requested. | |
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|---|---|---|---|---|---|---|---|
| 1 | | 5 | 21 | Suggest that ECO 1.2, Bldg 2-1120; ECO 1.1 Bldg 2-1138; ECO 1.1 Bldg 1731 be reconsidered for implementation. The pay backs are acceptable and the SIRs are barely below the guidelines. | A | ECO 1.2, Bldg 2-1120, ECO 1.1 Bldg 2-1138, and ECO 1.1 Bldg 1731 have been added to recommended list *Table 5.4.2.* | |
| 2 | | 6 | 2 | Table 6.1 is slightly confusing about incandescent. Replacement fixtures are compact fluorescent which is fine but under notes you say that incandescents larger than 200 watts will be replaced with 2-lamp F-32 T-8 fixtures. I think if you show in the existing fixture column incandescents under 200 watts and incandescents over 200 watts with the appropriate replacement, it would be clearer. | A | *Table 6.1* has been modified as requested. | |
| 3 | | | | The study is very well done. | | | |
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| Project Review Comments | Interim ☐ | Project: | **Limited Energy Study of Historic Red Brick Main Post Area** | Reviewer: DPWE FORT BRAGG | Page: 1 of 1 |
|---|---|---|---|---|---|
| | Pre-Final √ | Location: | **Fort Bragg, NC** | Name: SAM MUSULIN | Date: 4/18/95 |
| | Final ☐ | Year: | **P.N.** | Organizer: | |

| Comment No. | Vol. | Sec. | Page | COMMENTS ☐ Struc. ☐ Arch. ☐ Civ. ☐ Mech. ☐ Elec. ☐ San. ☐ Env. ☐ Fire ☐Other | Action Code | RESOLUTIONS (include location of documents) | Ref. |
|---|---|---|---|---|---|---|---|
| 1 | 2 | | | There are no summary cover pages for ECOs 3, 4, or 6. | A | Summary cover pages for ECOs 3, 4, and 6 have been added. | |
| 2 | 2 | | | There are no "Total Icca" sheets for ECOs 4 or 6. | A | Total Icca sheets for ECOs 4 and 6 have been added. | |
| 3 | 1 | | | Why is lighting cited for ten years instead of 15 for the economic analysis life on the Icca sheets for lighting. | A | ECO-1 lighting and economic analysis period changed to 15 years. New Icca sheets added. | |
| 4 | | | | These are fine documents which will be used to initiate several million dollars worth of energy projects. Well done! | | | |
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ACTION CODES:

A - Accepted/Concur D - Action Deferred N - Non-concur VE - VE Potential/VEP Attached W - Withdrawn